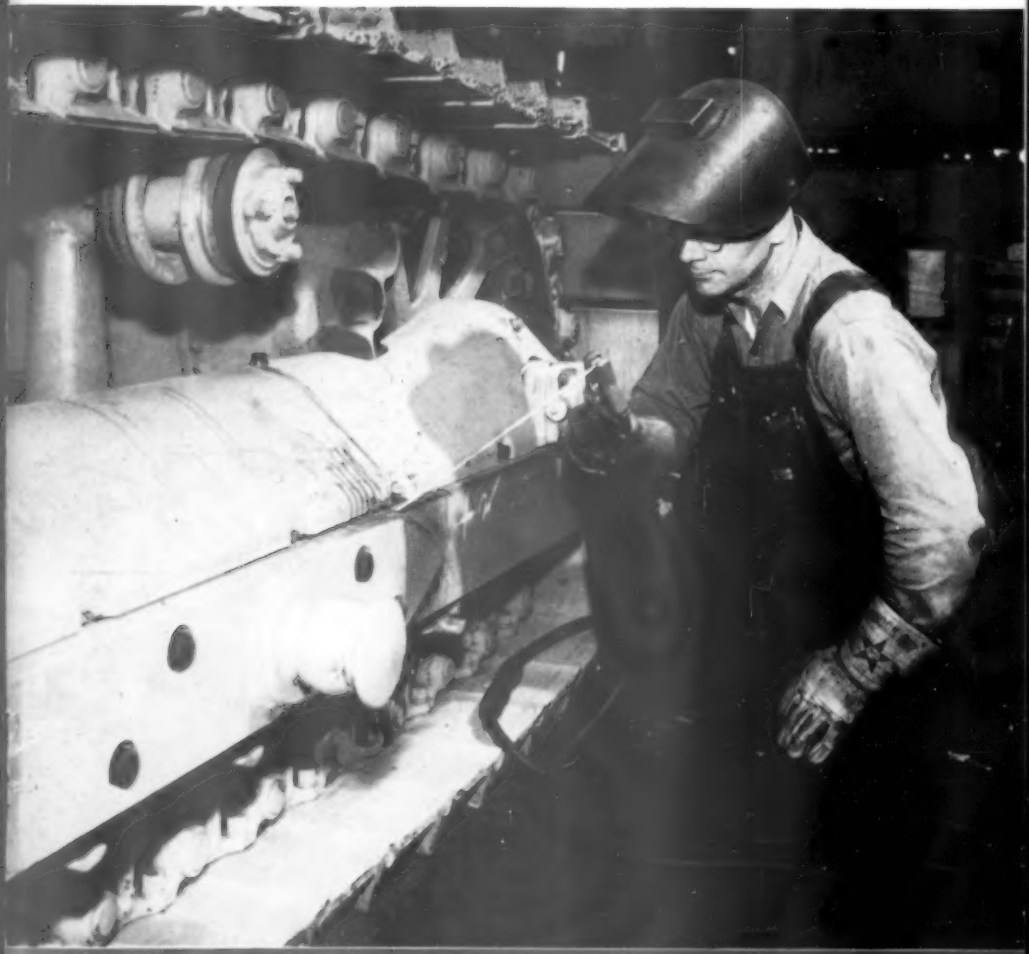
MARCH, 1955

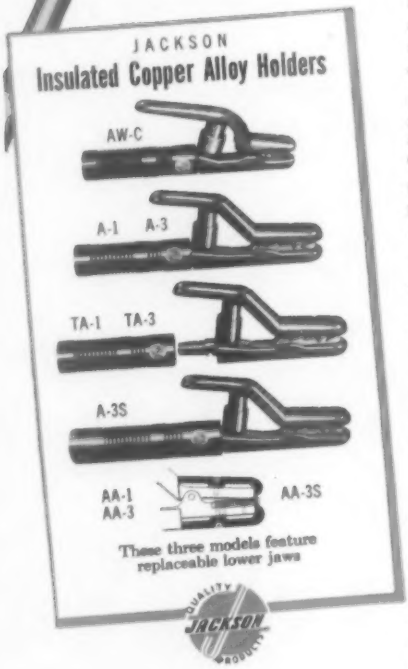
Industry & Welding



CIRCULATION

Use of efficient holders, cable connectors and vulcanized connections saves Caterpillar $1200 monthly. Exclusive story begins on page 34.

Duty-Cycle Rated for Top Production



In today's competitive race for stepped-up production, we see new welding machines and new electrodes coming on the market, all designed to do the work easier and faster.

Therefore, in choosing the right electrode holder for a job, don't think of *rod size* alone. We must equally consider *amperage* and *cable size*, and today, more than ever, the required *number of electrodes per hour*. These four factors combined establish the *duty cycle*, that is the percentage of actual arc-time in any ten-minute period of work.

The following table shows the duty cycles possible with the various *Jackson Insulated Copper Alloy Holders*, based on using the largest rods and cables these holders will take, operating at each holder's rated amperage.

Holder Class	Model Number	Electrode Size	Rated Amperage	Cable Size	Duty Cycle
SMALL	AW-C	7/32"	250	1	50%
MEDIUM	A-1, AA-1 TA-1	1/4"	300	1/0	50%
LARGE	A-3, AA-3 TA-3	3/8"	500	3/0	50%
HEAVY-DUTY	A-3S	3/8"	500	3/0	65%
	AA-3S	3/8"	500	4/0	80%

This table will help you in making the right selection from these Jackson copper alloy holders. Using a superior 98% copper alloy heat treated for greater strength, hardness and conductivity, these holders permit highest duty cycles with ample margin of safety.

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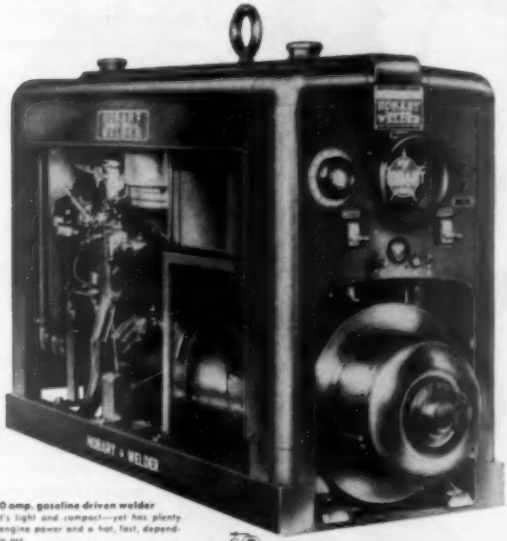

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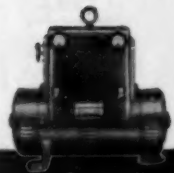

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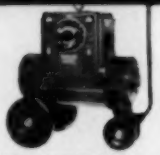
Hobart Powromatic eliminates troublesome electronic and electrical controls using your own automatic head. 400, 600 and 800 amp. sizes.



ELECTRIC DRIVE WELDERS for production, maintenance and repair welding. 200 to 600 amp. models.

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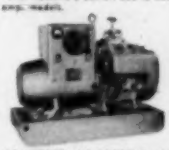

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Industry & Welding

MARCH, 1955
VOL. 28 No. 3

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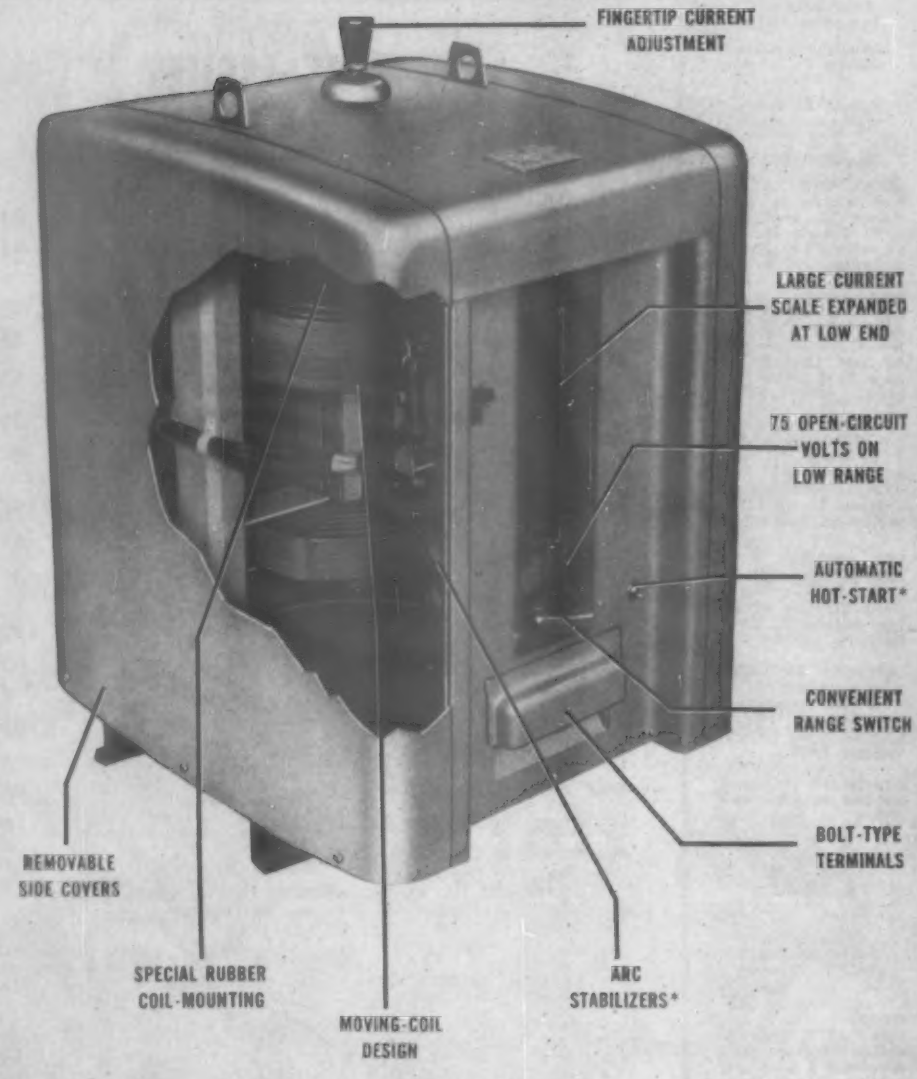

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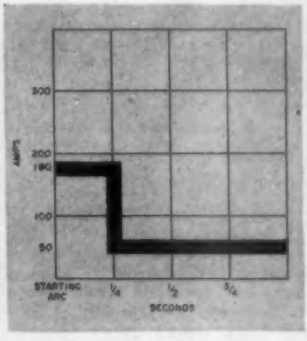

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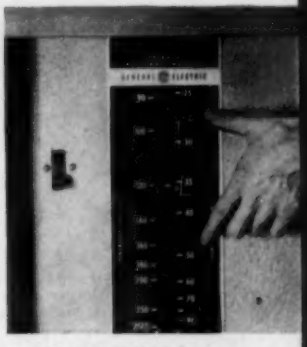

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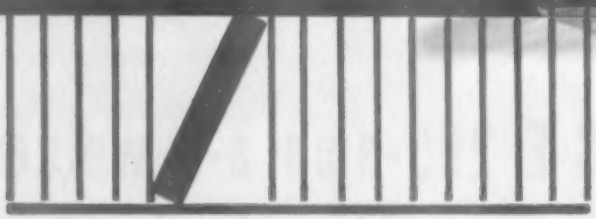

useful free literature

The publications featured on these pages were written by experts. They are FREE to our readers. To obtain these helpful reference materials use the postcard bound into this issue.

SOMETHING REALLY NEW IN WELDING CABLE is introduced in a folder offered by United States Rubber Co., Electrical Wire and Cable Dept. Folder explains how 60 percent natural rubber jacket and 60 percent natural rubber insulation combine to make a fluted cable that is cool, light, easy-to-grip and has excellent resistance to moisture and impact. **Circle No. 74.**

HOW TO GET EFFICIENCY IN WELD GRINDING—wire brushing, sanding and polishing operations are illustrated in interesting new application data recently made available by Stow Manufacturing Co. Bulletin 536 describes useful applications for flexible shaft tools, and a complete catalog of Stow machines and accessories. **Circle No. 77 on Reader Service Card.**

SPATTER CLEANING PROBLEMS can be minimized with Wayne Chemical Products Company's Spatter-Ex and Flash-Ex compounds. A leaflet is available describing these two compounds and giving their uses. Also included are instructions in the use of these compounds. **Circle No. 95 on Reader Service Card.**

A HANDY WALL CHART illustrating typical applications of stud welding is available from Nelson Stud Weld Div., of Gregory Industries. The "tell-at-a-glance" chart pictures stud welding equipment and gives dimensions of most commonly used studs. **Circle No. 96.**

A MAINTENANCE MANUAL prepared in case history form presents a series of soldering, brazing and welding problems and tells how they were solved. Every operation is described step by step. Alloys used, recommended methods and savings effected are explained. This 16 page illustrated handbook is available from Eutectic Welding Alloys Corp. **Circle No. 97.**

X-RAY EQUIPMENT FOR WELD INSPECTION is headlined in a well-illustrated, 8-page booklet issued by Holger Andreasen, Inc. Complete descriptions of portable units, their specifications and advantages are offered in easy to read form. **Circle No. 98 on Reader Service Card.**

HOW TO PREVENT ABRASIVE WHEEL FAILURES is discussed in a pocket size book issued by Wallace Tube Company. The 40-page illustrated book gives information on why grinding wheels fail and how to prevent this failure. Also discussed are ways to use abrasive wheels to get desired results. **Circle No. 99.**

WELDING OF NICKEL ALLOY STEELS is the title of a booklet available from The International Nickel Co., Inc. It is a study of various welding techniques, including some of the newer inert gas processes, electrodes, preheat treatments and post heat treatments. **Circle No. 100 on Reader Service Card.**

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HOW TO WELD ALUMINUM by arc, gas or inert arc methods is explained in simple terms in a booklet prepared by Metal & Thermit Corp. Also covered are specifications and operating characteristics of a full line of aluminum electrodes, wire and rods manufactured by this company. **Circle No. 101 on Reader Service Card.**

HOW TO WELD, BRAZE, SOLDER AND CUT steel with alloys and fluxes is explained in a pocket-size folder issued by All-State Welding Alloys Co., Inc. Condensed into only 200 square inches of printed area are operator instructions for 14 popular alloys and their companion fluxes. **Circle No. 102.**

A WELDER FOR HOME WORKSHOPS and beginning operators is graphically described in a mailing piece from Lincoln Electric Co. Operation of the "Selfweld" unit is explained. A number of recommended home applications are pictured and discussed. **Circle No. 103.**

LOWER ARGON COST is the title of an illustrated bulletin issued by Elematic Equipment Corp. describing the only recording flow meter on the market. A discussion of applications for flow meters which measure argon usage and loss is presented together with complete design data. Of interest to all users of inert arc welding equipment, the sheet is catalog size. **Circle No. 104 on Reader Service Card.**

AIR INFLATED GRINDING WHEELS, their design and applications are treated in graphic form in a new 6-page folder published by Nu-Matic Grinders, Inc. A parts price list is included. **Circle No. 105 on Reader Service Card.**

INDUSTRIAL APPLICATIONS OF CARBON DIOXIDE are highlighted in a colorful, pocket size pamphlet prepared by Liquid Carbonic Corp. Included is a thumbnail description of its use in inert gas arc welding and other metalworking processes. **Circle 106 on Reader Service Card.**

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A NEW STREAMLINED PICTURE BULLETIN with essential facts and capacities on welders, electrodes and positioners has been released by Harnischfeger Corp. Included is a large map showing location of the company's warehouses, parts depots, sales offices and dealers. **Circle No. 107 on Reader Service Card.**

CORRECT USE OF TEMPERATURE INDICATING COATINGS is explained fully in literature issued by Tempil® Corp. Among topics dealt with are temperature distribution along a surface and survival of coatings subjected to high velocities or high centrifugal force. Also included is a list of Fahrenheit ratings in which Tempil® Corp. coating is available. **Circle No. 52.**

WIRE STRAIGHTENING AND CUTTING MACHINES for many jobs are highlighted in a bulletin from Lewis Machine Co. Typical models are illustrated. Handy chart tells which machine is needed to solve various production problems. **Circle No. 108 on Reader Service Card.**

A NEW STEEL STOCK LIST with indexed and cross-referenced listings has been prepared by U.S. Steel Supply Corp. Information is specific and complete. The book is divided into four sections: Special metals, industrial supplies, carbon steels and prices. **Circle No. 13 on Reader Service Card.**

A SOLDERING TIP that slips on and off your present welding torch in a jiffy is said to save greatly on acetylene consumption and to completely eliminate the need for oxygen. Prices, sizes and operational advantages are listed in colorful material from Anzick Mfg. Co. **Circle No. 109 on Reader Service Card.**

SOLDERING FLUXES FOR A WIDE VARIETY OF METALS are discussed in an informative guide which lists the complete line and physical properties of fluxes available from Alpha Metals, Inc. Also provided is worthwhile tabular data on the solderability of metals. **Circle No. 110 on Reader Service Card.**

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P&H High Frequency AC Welder of the type used at Ryan.

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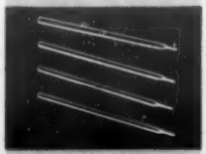

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They're welding titanium down to .016" at Ryan Aeronautical Company

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Literature Featured In Ads This Month

(CIRCLE ON ENCLOSED POSTCARD, NUMBERS OF LITERATURE YOU WISH TO RECEIVE)

2 **Contact type electrode** is available for use in trial sample. HOBART BROS. CO. Page 1.

4 **Blowpipe** with automatic pilot light is featured in folder. WELDIT, INC. Page 3.

6 **295 AMP AC welder** is detailed in bulletin. GENERAL ELECTRIC CO. Pages 6-7.

7 **Efficient welding circuit** program is outlined in pamphlet. ERICO PRODUCTS, INC. Page 9.

9 **New fluted welding cable** and its advantages are explained in folder. U.S. RUBBER CO. Page 11.

12 **High frequency welders** designed for tough to weld metals are highlighted in brochure. HARNISCHFEGER CORP. Page 14-15.

13 **Metals** warehoused in your territory are catalogued by sizes and specifications. U. S. STEEL SUPPLY DIV. Page 17.

14 **Welding positioners** in a wide range of capacities are presented in bulletin. CULLEN-FRIESTEDT CO. Page 18.

16 **Pneumatic chippers and grinders** are fully discussed in folder. MASTER PNEUMATIC TOOL CO., INC. Page 20.

17 **Positioners** for loads up to 50 tons are headlined in bulletin. WORTHINGTON CORP. Page 21.

18 **How flux recovery** dovetails with dust control is explained in folder. INVINCIBLE VACUUM CLEANER MFG. CO. Page 22.

19 **Soldering, brazing, heating** needs are discussed, equipment described in bulletin. LINDE AIR PRODUCTS DIV. Page 23.

23 **Portable electrode drying oven** is featured in informative brochure. PHOENIX PRODUCTS CO. Page 28.

25 **Automatic welding wire** for a wide assortment of metals is featured bulletin. PAGE STEEL AND WIRE DIV. Page 30.

26 **Iron powder coated electrodes** are explained in interesting booklet. WESTINGHOUSE ELECTRIC CORP. Page 31.

27 **Automatic flame cutting machine** for close tolerance work is headlined in illustrated brochure. AIR REDUCTION SALES CO. Page 33.

29 **Hard facing alloys** are catalogued with full metallurgical information. AMERICAN MANGANESE STEEL DIV. Pages 40-41.

30 **Resistance welding** equipment for specialized automatic operation is covered in pamphlet. FEDERAL MACHINE AND WELDER CO. Page 44.

31 **Brazing folder** gives complete story on copper brazing alloys. UNITED WIRE AND SUPPLY CORP. Page 51.

33 **Heavy-duty AC welder** is fully detailed in bulletin. HARNISCHGEGER CORP. Pages 56-57.

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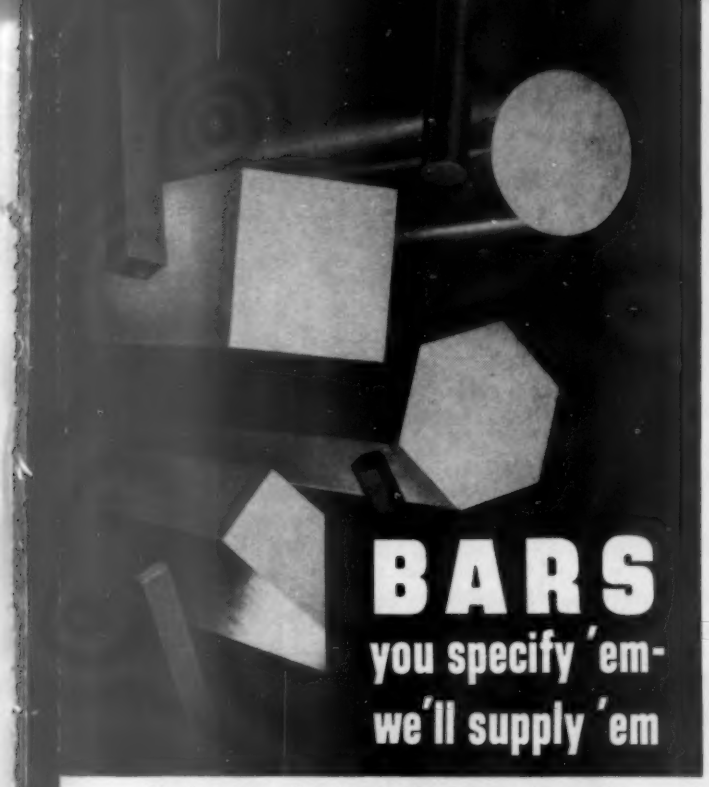
36 **Nickel-silver brazing rod** and its

47 **Abrasive wheels** for every finish-



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36 **Nickel-silver brazing rod** and its applications are discussed. ALLSTATE WELDING ALLOYS CO., INC. Page 63.

39 **Welding cast iron** with nickel alloy electrodes is covered in booklets. INTERNATIONAL NICKEL CO., INC. Page 66.

42 **New type electrode holders** are described in illustrated circular. H. J. WAGNER PRODUCTS, INC. Page 72.

44 **Hard facing** is made easy with engineering data from WALL COLMONOY CORP. Page 71.

45 **Flame cutting** machine is featured in bulletin giving full details. OHMSTEDE MACHINE WORKS. Page 74.

47 **Abrasive wheels** for every finishing purpose are highlighted in informative bulletin. BAY STATE ABRASIVE PRODUCTS, INC. Page 79.

48 **Resistance welding electrodes,** holders and materials are listed in useful catalog. P. R. MALLORY & CO., INC. Page 81.

49 **Combination welder** offering both AC and DC is fully covered and advantages explained. LINCOLN ELECTRIC CO. Page 83.

50 **Temperature indicating** pellets are offered for trial use. TEMPIL® CORP. Page 84.

53 **Resistance welding** electrodes for every purpose are discussed in bulletin. TIPALOY, INC. Page 87.

When a touch on a button moves weldments like these into the correct, most convenient position for a downhand pass, you get more arc time, more welding at lower cost. C-F power operated Positioners rotate the work in a full circle at any point in a range of 135° from the horizontal — giving welders a choice of an infinite number of downhand welding positions instantly.

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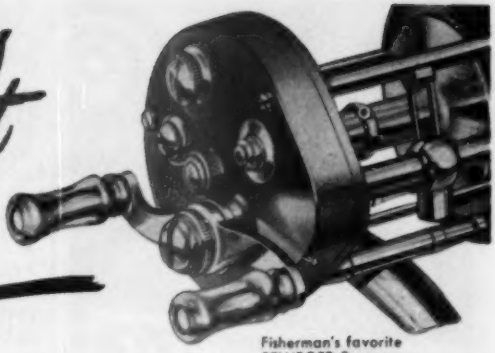

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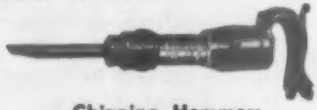

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MASTER PNEUMATIC TOOL COMPANY, INC.
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54 **Copper plated vise pliers** are fully described in informative literature. H. R. BASFORD CO. Page 89.

56 **Tungsten electrodes,** specifications and applications are described. NORTH AMERICAN PHILLIPS CO. Page 93.

57 **Portable, semi-automatic positioner** is headlined in brochure. PANDJIRIS WELDMENT CO. Page 90.

60 **Brazing compounds and fluxes** are discussed in folder. CHICAGO HARDWARE FOUNDRY. Page 94.

58 **Welder brushes** are described with complete specifications. BECKER BROS. CARBON CO. Page 94.

62 **C-clamps,** ground clamps and other types are listed in 32-page catalog. ADJUSTABLE CLAMP CO. Page 98.

66 **Cutting torches** with easily exchangeable tips are discussed in folder. SMITH WELDING EQUIPMENT CORP. Page 101.

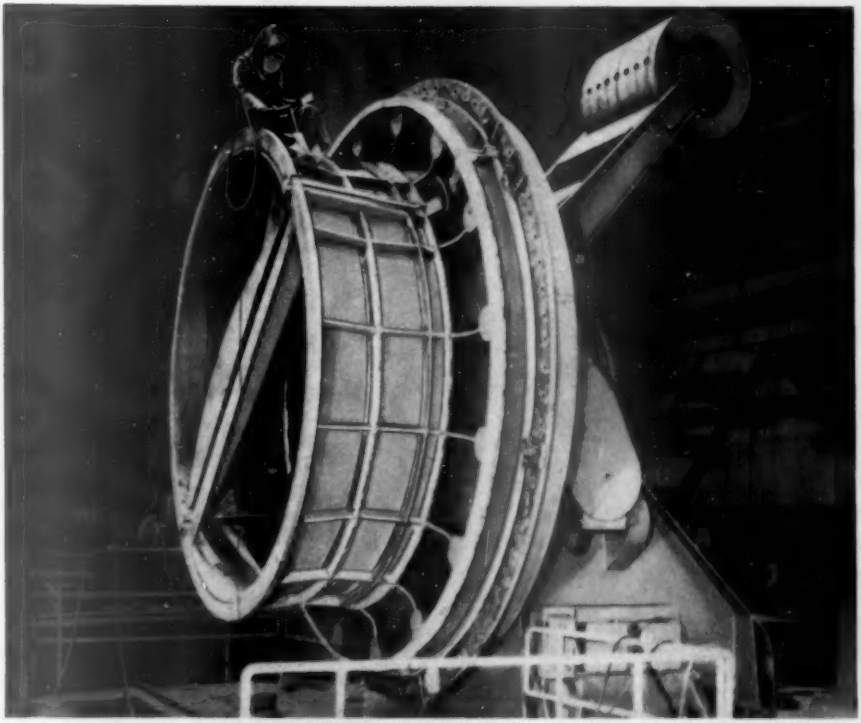
69 **Clamps** for every purpose are catalogued and discussed. CINCINNATI TOOL CO. Page 103.

73 **One man bender** for pipe, bar, flat stock and other materials is highlighted in bulletin. HOSSFELD MFG. CO. Page 104.

80 **How pipe welding problems** are eased with bevelling equipment is explained. H & M PIPE BEVELING MACHINE CO. Page 107.

81 **Flexible shaft grinders,** uses and specifications are featured in bulletin. R. G. HASKINS CO. Page 107.

94 **Lightweight electrode holder** is featured in descriptive folder. DURO ENGINEERING CO. Inside Back Cover.



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Flux Recovery Systems

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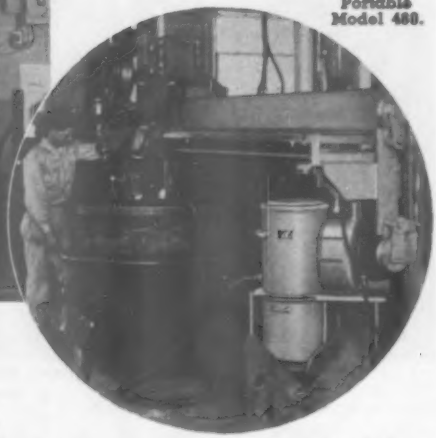

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Pressure-Compensating REGULATORS

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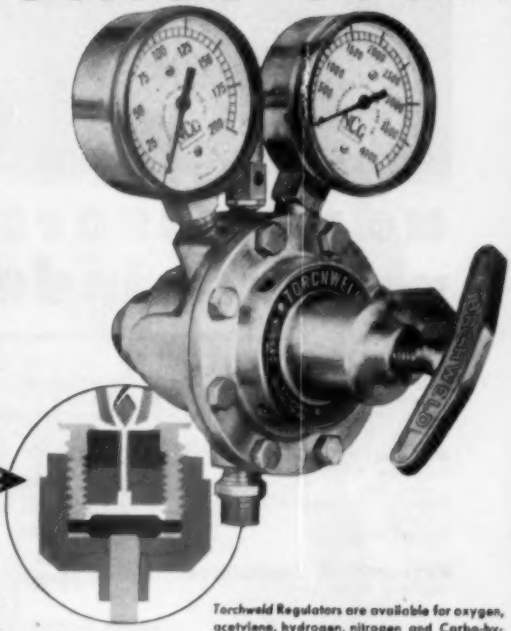

Pictured at the right is the exclusive pressure-compensating chamber located below the valve seat of these regulators. This ingenious device gives you the same precise and unvarying flows that you get in more complicated and expensive two-stage models. *It permits you to set the regulator once and forget it until the job is through* despite the drop in cylinder pressures that occurs as gas is withdrawn from the cylinder. In short, you get two-stage performance. Yet 6580 Series regulators, which fill practically all single cylinder needs, cost no more than conventional single-stage types. For multiple cylinder use, the 6500 Series are available at slightly higher cost.

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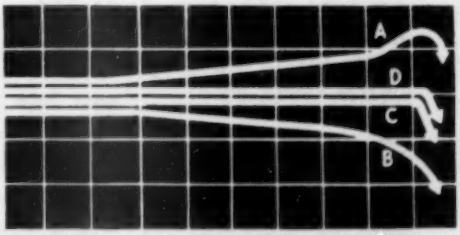

Performance Graph of Various Types of Regulators

(a) Typical stem-type single-stage regulators deliver increasingly higher rate of flow as cylinder pressure drops. (b) Typical nozzle-type single-stage regulators deliver progressively lower rate. (d) The *Torchweld* Regulator delivers the same uniform flow as (c) two-stage regulator, but at much lower cost and with fewer working parts to wear out and cause trouble. *Torchweld* has all the advantages and none of the disadvantages of single- and two-stage regulators.

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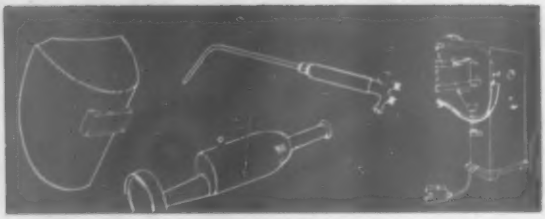

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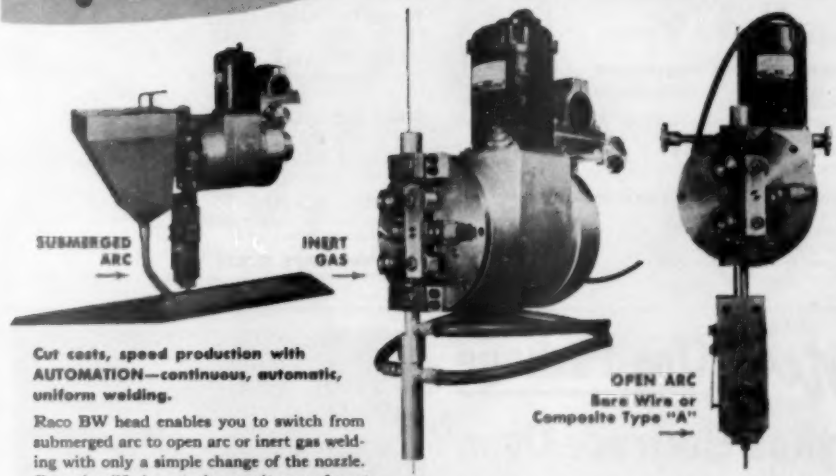

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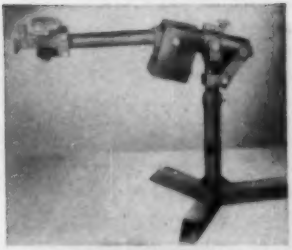

UNIVERSAL Balanced POSITIONING
Model C 500 shown
25 lbs. to 2,000 lbs. capacity

HEAVY DUTY GEAR DRIVEN POSITIONING
Model HD 25 shown
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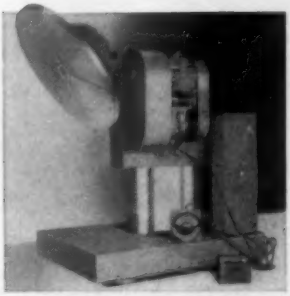
HEAD and TAIL STOCK POSITIONING
Model HTS 5 shown
Capacities 5,000 lbs. to 160,000 lbs.



MODEL 21 (shown) SUPER GEAR DRIVEN POSITIONER with powered rotation tilt and elevation.

MODEL X-21 Powered rotation, ball bearing manual tilt and elevation.

MODEL 21-P Powered rotation and tilt, ball bearing manual elevation.

MODEL 21-E Powered rotation and elevation, ball bearing manual tilt.

MODEL X-21-PE Powered rotation, tilt and elevation. 5000 lbs. capacity @ 6" CG location.

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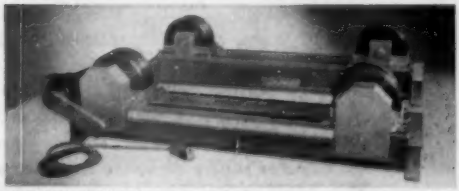

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Aronson MACHINE COMPANY
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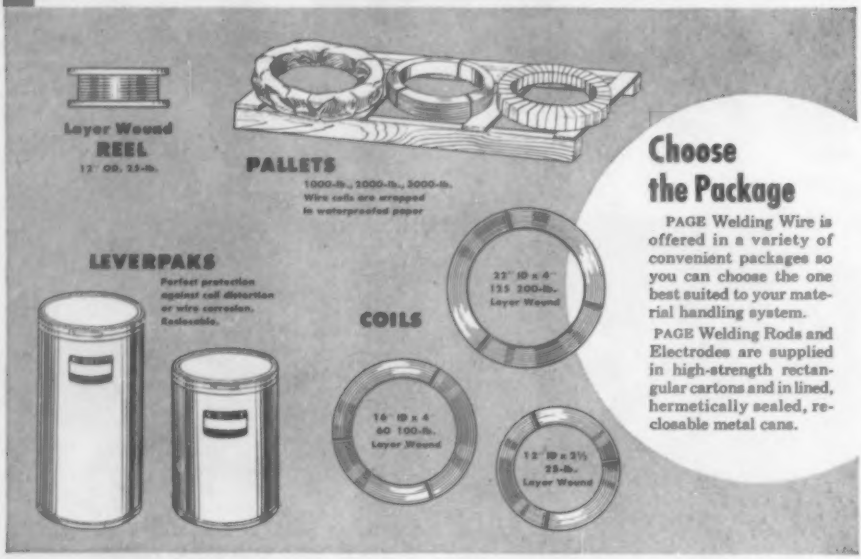

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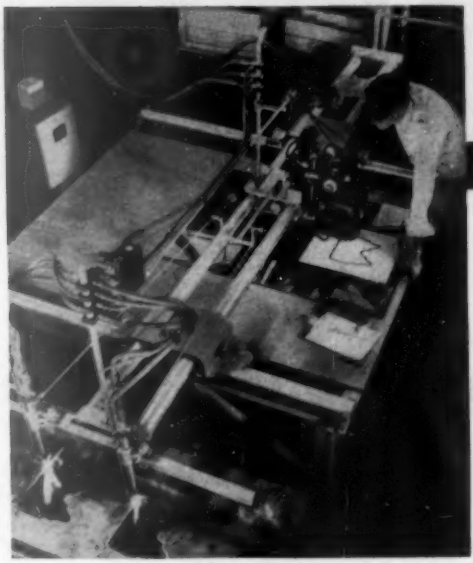

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Damaged cable "whip" is exchanged for repaired one to keep operator downtime to a minimum.

Repaired lead is connected and ready for use. Damaged cable is being repaired in tool crib.

Effective Welding Circuit Maintenance

by **DONALD L. CALDWELL**
Welding Supervisor
Caterpillar Tractor Co.

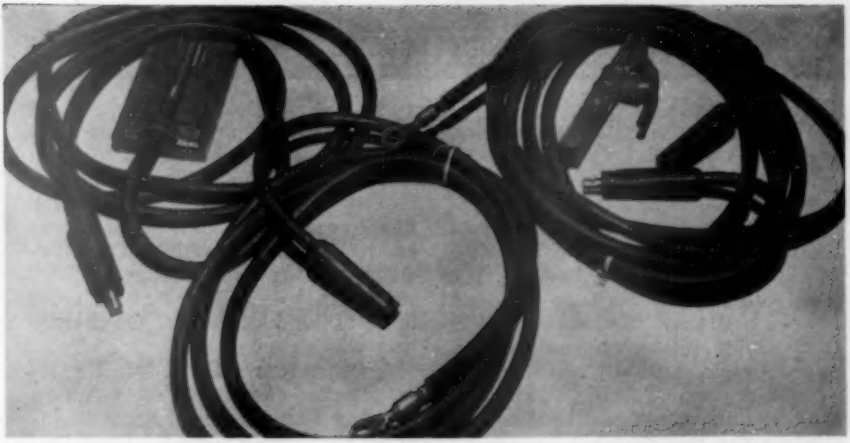
AN effective program of welding circuit maintenance, initiated in 1951 at Caterpillar Tractor Co. in Peoria, Ill., and now virtually complete, has resulted in continued savings averaging approximately $1200 per month. Careful analysis of the ever present problems of maintaining quality yet limiting material and operating costs has enabled this nationally recognized company to set a record for efficiency and cost control. How this was accomplished is worth recording; is important information for all other companies faced with similar maintenance problems.

Because of the heavy machinery used in fabrication of road building equipment, one of the most serious cost problems encountered by Caterpillar was its inability to salvage the considerable quantities of welding cable damaged in the shops.

Various methods of splicing damaged sections were tried and discarded. Some were unsatisfactory from a standpoint of conductivity. Others were dangerous from a safety standpoint. Those which were reasonably efficient were far too costly for regular use.

Another serious problem was the effect on welding quality which resulted from current loss due to poor conductivity in welding circuits.

Not only cable, but also holders,



Keys to efficient welding circuit maintenance are shown here. These include welded solid copper joints, vulcanized insulation covering and lock-type quick connectors.

Saves Caterpillar $1200 per Month

connectors and ground clamps heated up excessively. This heating and subsequent cooling caused weakening at connections which, in turn, caused frayed and broken cables. In the case of soldered joints, excessive heating-up caused the solder to melt out. Clamp joints loosened, caused arcing and subsequent current loss. All of this necessitated continual maintenance.

In addition to actual costs involved, the more serious problem of operator discomfort was an im-

ANALYSIS OF SAVINGS EFFECTED

1.	Salvage 96% of cable formerly discarded	$ 900.00
2.	Lowered maintenance labor cost 50%	
3.	Reduced Quick Connector maintenance costs 65%	
4.	Reduced Ground Plate cost and increased life 300%	
5.	Increased Electrical efficiency 15%	300.00
6.	Increased operator efficiency because of heat-up elimination in circuits and holders.	
7.	Elimination of Safety Hazards	
	Savings per month	**$1,200.00**

All-welded copper joints, vulcanized insulation

portant factor. During production welding on heavy jobs, it was necessary for operators to use two holders and to alternate them as each became too hot to handle. In addition to the double cost involved in the use of multiple holders, the men also needed buckets of water in which the hot holders were left to cool. This added considerably to maintenance costs by causing severe corrosion of cable strands at holder connections, and thus necessitating too frequent repairs.

How the Problem Was Attacked

When it was determined that the various types of mechanical and soldered joints had failed to adequately provide what Caterpillar wanted in the way of more efficient circuits, various other methods were attempted.

The first of these, using silver solder instead of soft solder, was eliminated because of excessive cost. Though the joint was much more efficient, the price, more than ten times that of soft solder, did not justify the result. There still remained the problems of excessive damage and burning of cable insulation during installation — especially on lugs, etc.—and the need to properly clean the flux to avoid loss of conductivity. Obviously, this was expensive.

Another method, tried and finally adopted as standard practice, was the Cadweld, a process developed by Erico Products, Inc. This interesting thermit-type joint produced a solid homogeneous copper weld which is as efficient as the cable itself. It was the only process which provided 100% conductivity and yet produced permanent maintenance-free joints.

How One Problem Was Solved

With this all copper-welded connection, melt-out, burn-out, loosening and corrosion are completely eliminated. Properly used there is

1 Damaged cable is placed in mold for splicing. Cable ends are prepared and clamped in graphite crucible.

2 Powdered copper oxide is ignited by spark lighter. Solid copper welded joint is completed in 10 seconds.

and quick connectors salvage damaged cable

no damage to insulation. With inexpensive equipment — less than $30 — an insignificant factor in Caterpillar operations — no special skill is required to produce trouble-free joints. Materials are no more expensive than ordinary solder.

Yet there were other problems to solve before Caterpillar was completely satisfied that its circuit maintenance program was at peak efficiency.

Importance of Proper Insulation

Without proper insulation, even the best connections may cause trouble. Aside from the all important problem of current loss, there are safety factors to consider.

Most logical insulating material, tried first but found inadequate, was regular friction tape. This lacked durability under abrasion due to sliding and flexing. It was unable to withstand heat from the cable, was burned badly and frayed by spatter. In service, with cable getting greasy and oily, tape would not stay in place.

Even more expensive insulating tapes were tried, but these too, were unsatisfactory for the same reasons. Actually with 400-500 amps going through connections, slipped insulation, with bare strands arcing, represented a serious safety hazard. This caused the decision to eliminate use of tape of any kind.

Vulcanizing Proves Most Efficient

After various rubber sleeve arrangements were tried and discarded for a variety of reasons, it was decided to try rubber vulcanized cable connections.

A series of tests were conducted and the Joy Mfg. Company vulcanizer was chosen. Naturally, the size and extent of a company's maintenance problems must determine advisability of using such

3 Splice in welding cable is wrapped with neoprene tape before vulcanizing. Vise-type pliers hold cable.

4 Low-cost aluminum mold is used in vulcanizing process. Durable insulation prevents arcing.

equipment. At Caterpillar it was considered a very low cost investment. Several such units, suitable for less demanding operation are available at very low cost. Subsequent results—and savings—substantiated the writer's opinion of this type of equipment.

Vulcanizing is done easily and efficiently by maintenance personnel. Aluminum molds used in the Joy process, are furnished by the manufacturer at relatively low cost. For special applications new molds are easily made. Neoprene wrapping tape, actually less expensive than conventional tape when length of service is considered, is used in making the vulcanized splice.

The finished joint, using welded copper (Cadweld) connections and vulcanized insulation, is as efficient and durable as the cable itself. Having excellent insulating qualities, the connection virtually eliminates safety problems. Its small profile makes it safe to drag cable when necessary, since the load is spread over both insulation and connection.

Result of this procedure has been Caterpillar's ability to salvage and re-use about 96% of welding cable.

Example of Cost for Typical Cable Repair

Including a full copper splice and vulcanized insulation, but not including amortization of the vulcanizer, here is how Caterpillar estimates cost of each joint.

Cadweld material	$ .385
Cadweld mold cost	.015
Neoprene tape	.09
Labor	.51
Total	$1.00

The amortized vulcanizer cost is not listed since no repair has been necessary, and the small cost for electricity (about that of using an electric iron) is too insignificant to be calculated in the huge Caterpillar operation. Minor injuries to cable insulation with no conductor damage, cost about 25 cents per repair.

Since 2/0 cable in 1000′ reels costs about 50 cents per foot, and 3/0 about 60 cents per foot, it is obvious that this program, enabling the operation to reclaim 96% of cable formerly scrapped, results in considerable savings. Actually, this saving alone amounts to about $900 per month.

Problems in Relation to Arc Welding Accessories

Because conductivity problems, overheating of cable and accessories, high maintenance costs, etc. were prevalent throughout all welding circuits, it was necessary also to apply the same corrective measures to accessories. Thus holders, cable connectors, lugs and grounds were carefully examined and efficiency — or lack of it — analyzed.

Lugs

Starting with cable connections at machines, it was decided to use special lugs with studs suitable for the same type of welded copper connections as used to join the cable. These studs, though slightly more expensive than conventional solder or crimped types, proved so much more efficient and long lasting the very small additional cost is justified.

Quick Connectors

Believing very strongly in the use of electrode holder leads, or

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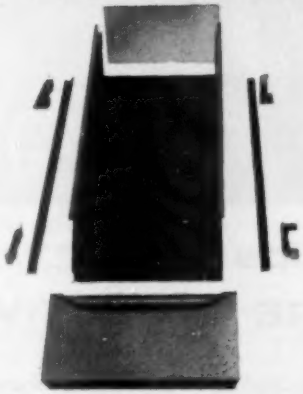
BUILD BETTER METAL OFFICE FURNITURE

SPECIAL WELDER COMPLETES 300 9-PIECE DRAWER ASSEMBLIES PER HOUR



Desk drawer units in the new General Fireproofing Generalaire* line of metal office furniture are assembled and welded on special automatic resistance welder designed and built by Federal.

Nine separate parts are spot and projection welded in this machine to produce a complete drawer assembly. Dual shuttle fixtures are employed permitting maximum utilization of the welder. While one fixture is being loaded and reloaded at one end of the machine, the fixture on the opposite end is in the welding station. With an operator at each fixture loading station, a total hourly production of 300 drawer assemblies can be obtained.

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"whips", the writer next investigated the various available types of quick connectors. Though many of these had valuable features, one type proved most efficient. This was the Cam-Lok, a locking type connector made by Empire Products and adapted for use with the welded type copper cable connection.

The use of "whips"—a short length of cable welded at one end to a quick connector and at the other to an electrode holder—has eliminated cost of operator's waiting time, maintenance man's time and overhead. They minimize operator fatigue by giving him a lighter, more flexible lead which is much easier to manipulate. By having spare "whips" available, these can quickly be put on the job in the event of an emergency or holder breakdown.

Insulators for the quick connectors are vulcanized in a special mold, the same equipment as used for cable. Both halves of the connector are thus insulated and permanently attached to the cable insulation. This method has resulted in complete elimination of arcing and former high maintenance costs of replacing cracked or broken fiber connectors. The connections and cable strands are protected and a good, waterproof joint results.

This program reduced maintenance on quick connectors by approximately 65%.

Grounds

On most Caterpillar operations, because of the size and type of weldments produced, conventional ground clamps cannot be used. Instead, such grounds are fabricated from scrap plate approximately 5" x 7" x 1" thick.

Normal procedure now is to first attach the cable to a cold rolled rod by welding it with the thermit type copper

(Continued on Page 63)

Automatic submerged arc welding deposits 2¾-inch wide bead of wear-resistant material in one pass. Boom provides lateral movement and vertical adjustment.

Automatic Hardfacing Cuts

Oscillating attachment, multiple electrodes and special flux cut 1½-hour welding job to 22 minutes. And service life is doubled . . .

THE Euclid Division of General Motors Corp., Cleveland, Ohio, manufacturer of earth moving equipment, has cut an hour-and-a-half job of hardfacing 10-foot road scraper blades to 22 minutes, a 75 percent time saving. This was done by utilizing three new developments in automatic submerged arc welding.

A 10-foot scraper blade is an assembly of four separate units. Each unit of the ¾-inch thick blade measures approximately 30 by 16-inches. Before assembly, each unit is given a cutting edge of wear-resistant alloy to produce longer service life. A 2¾-inch

200 percent service life increase is reported by users of hardfaced scraper blades. Weld deposit resists both impact and abrasion and is about 54 Rockwell C.

Welding Time 75 Percent

wide bead of weld metal is deposited on the edge of the blade. This metal is designed to resist both impact and abrasion and is about 54 Rockwell C. Both top and bottom edges of the blade are hard faced on opposite sides to permit reversing the blade.

Until recently the hardfacing beads were deposited by manual arc welding, using chromium-carbide electrodes. Each blade required that welding be done in a specified sequence to minimize distortion.

To reduce costs, it was decided to change to automatic submerged arc welding. This decision was influenced by several new developments in automatic hardsurfacing which offered a solution to the problem of depositing a wide and shallow bead of hardfacing metal with no distortion or cracking and in a minimum of time.

The first of these new developments is an attachment for a standard automatic head which oscillates the head back and forth as it travels forward. The entire head is oscillated so that a wide bead is produced. Oscillations can be varied in both width and speed, thus weaving the bead to produce shallow deposits up to 4-inches wide.

Used in conjunction with this

(Continued on Page 75)

Another Way to HARD-FACE CRUSHER JAWS WITHOUT DISTORTION

A good many operators of crushing equipment consider the hard-facing of jaws a mighty ticklish job; the bugaboo being distortion resulting from welding heat. But H. D. Sutcliffe, maintenance weldor at Buell-flat Rock Company in Solvang, California, has a good answer to this problem. Perhaps his method will be applicable to your operations.

Mr. Sutcliffe has a large rack on which he places a number of spare crusher jaws or segments side by side. During the course of the day skip welds are applied from jaw to jaw as time allows, using Stoody Moly-Manganese for rebuilding and Coated Tube Stoodite for the final passes. In this way welding heat is never permitted to build up sufficiently to cause warpage. The Moly-Manganese deposits are peened and wire brushed as they are laid down. By the time the jaws on the rack are finally rebuilt and hard-faced, it is time to remove the worn jaws from the crusher, setting them up for the same rebuilding treatment.

Wear on the crusher is checked at frequent intervals and plates are removed for rebuilding before serious wear occurs. With this procedure it is rarely necessary to buy replacements. The company's experience is that Stoody Moly-Manganese and Coated Tube Stoodite are regularly giving 2 to 3 times the wear of other materials previously used.

Your Stoody dealer (consult the yellow pages of your telephone directory) will be glad to give you descriptive literature on all Stoody alloys, and a copy of the Stoody Guidebook covering maintenance of all types of heavy equipment. Or you may write to the company.

STOODY COMPANY
11924 East Slauson Avenue Whittier, California

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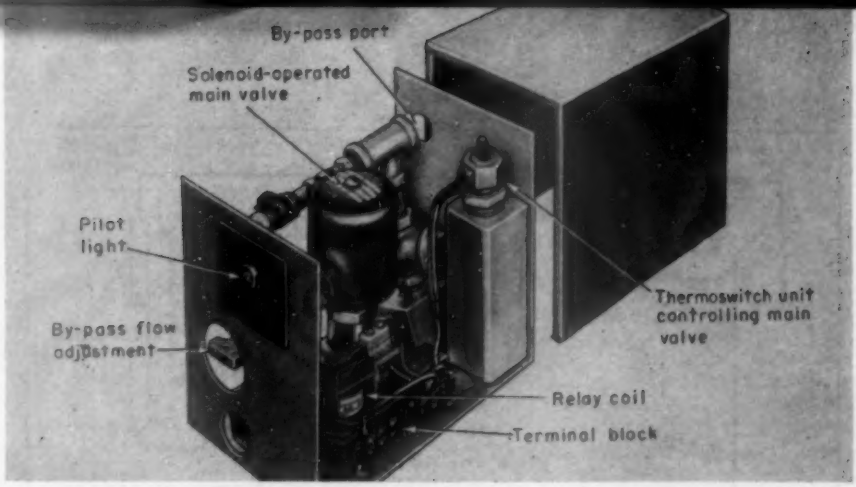


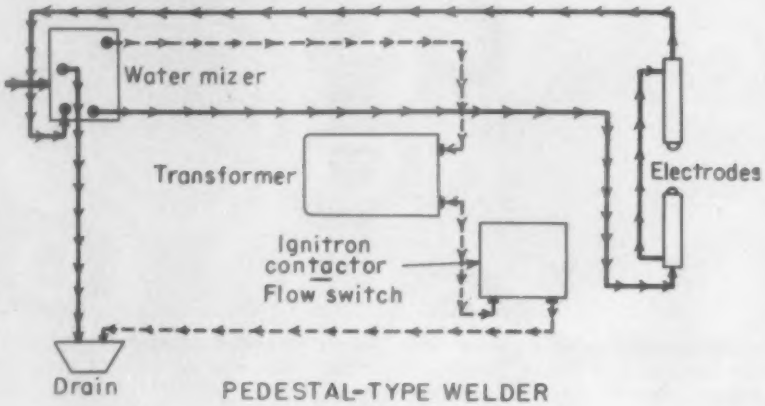
Solenoid-operated valve regulates water supply to cooled equipment on basis of actual need is shown here. Unit supplies full water flow as soon as equipment is started. Flow continues after equipment shuts down until thermostat in return line senses a safe temperature.

Automatic Flow Valve Saves Water, Keeps Resistance Welders Cool

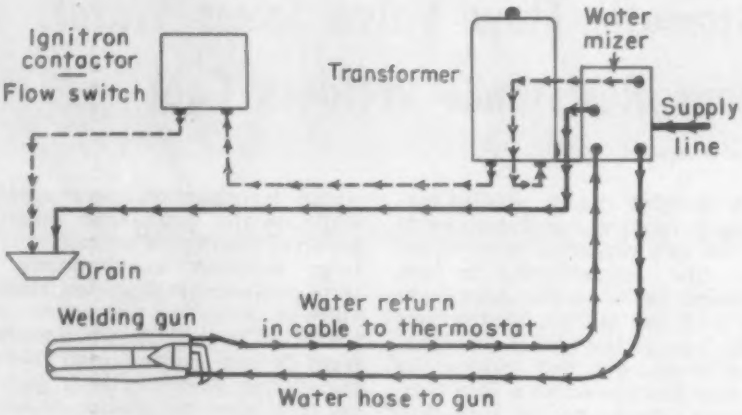
THE operator of water-cooled machines, such as resistance welders, has two important responsibilities: first, remembering to turn the water on when the equipment goes into use; second, shutting off water flow at the end of the operating cycle, but *not* before the machine has cooled to a safe temperature. To be on the safe side, many operators allow the cooling water to flow continuously, even though the machine may be used intermittently. Large amounts of water can be wasted this way. A more foolproof and economical procedure is to install a simple, automatic flow valve on the water lines.

An automatic valve can reduce water consumption substantially, while at the same time assuring positive cooling. For example, a large midwest manufacturer of farm implements installed such a valve in a cooling water line to a 300 KVA projection welder. Metered water consumption before installation averaged 3802 gallons per day; after installation, it dropped to 641 gallons—a saving of 3141 gallons (82 per cent) per day on a single welder.

One regulating valve of this type, called the Water Mizer, is designed to assure an adequate coolant supply at all times, while eliminating waste entirely. It automatically turns on the water supply as soon as it is needed and



PEDESTAL-TYPE WELDER



GUN-TYPE WELDER

When using automatic flow valve with pedestal-type or gun-type welders, these suggested piping connections can be used. Heavy solid arrows indicate solenoid-controlled main flow. Lighter, broken arrows indicate by-pass line that also carries main flow.

turns it off again as soon as the equipment has safely cooled. Manufactured by Van Vooren Products, the Water Mizer, consists primarily of a solenoid-operated water valve and a thermostatic shut-off.

Relay Opens Valve

When the valve is used with welding equipment, an air solenoid valve coil or clutch solenoid on the welder opens the valve in the Water Mizer through a relay. With other equipment, the valve may be wired to the contactor coil. As long as the operation continues, the solenoid holds the valve open, providing a full flow of water to the equipment. A return line from the equipment carries the water back to the valve where the flow is monitored by a Thermoswitch unit before going to drain. A pilot light indicates when the water is flowing through the valve.

The Thermoswitch, a precision thermostat, manufactured by Fenwal Inc., Ashland, Mass., is normally-open and is wired in series with the water valve solenoid. As soon as the water temperature in the return line exceeds 100 F, the thermostat contacts close to form an alternate circuit to the valve solenoid. When the weld is completed, the valve solenoid, controlled by the welding machine, is de-energized. However, because of the parallel circuit through the thermostat, the valve is held open as long as the temperature in the return line exceeds 100 F. This feature is not a time delay, but a thermal delay. It therefore corrects for such environmental variables as ambient temperature, pressure changes in the water supply, and varying periods of equipment use—all of which can affect cooling efficiency. When the return water drops below 100 F, indicating a safe equipment condition, the thermostat contacts open, de-energize the solenoid, and cut off the water flow.

The thermostat is set at 100°F to prevent low temperature water from collecting in the feed lines to the machines. Otherwise the lines would sweat and possibly cause corrosion problems around the equipment. The thermostat itself is installed directly in the return line by means of a threaded fitting. The outer shell of the thermostat, which extends 3" below the threads and is ⅝" in diameter, is itself a functional element. Expansion or contraction of the shell is transmitted to low-expansion internal struts, making and breaking a set of contacts on the struts, and thereby actuating the control circuit. The unit has an inherent sensitivity of 0.1 F.

How to Install

Two suggested methods of installing the Van Vooren Water Mizer unit in coolant lines to welding equipment are illustrated. Note that the transformer and contactor receive a small continuous by-pass flow around the unit's main valve. The by-pass flow is adjusted so that it is just large enough to keep the flow switch in the ignitron contactor from operating. This enables the transformer, which generally cools slowly, to continue cooling even after the solenoid valve has closed. The by-pass flow is replaced by a full flow of ½-in. port) as soon as welding is started. Although the transformer and contactor can be put in series in the main water line if desired, the by-pass arrangement is recommended to assure a supply of water to the equipment in the event the main line becomes blocked.

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Welded Sections

Machine tracing templates are used to speed flame cutting of parts that are used in any sort of quantity (left).

Over a ton of electrodes are used each month in fabrication of bases.

Tacking and assembling of weldments is done on special welding platform. This sizing base is fabricated from $\frac{1}{2}$-inch plate.

up to 11" Thick Used for Machine Bases

PIONEER in welded fabrication of machine bases and components, the Yoder Company of Cleveland, Ohio, has proved that welded fabrication is efficient. In addition, welding has eliminated for Yoder the need for a large number of expensive, seldom-used patterns that are difficult to store and soon become obsolete.

The extent of the company's use of welding is indicated by its production figures. In 1953 the firm shipped equipment all over the United States and to many parts of the world. This included 1,353,000 lbs. of weldments ranging in size from ¼ to 20,000 lbs. In fabricating these weldments, it is estimated that Yoder uses well over a ton of welding electrodes, 130 tanks of oxygen and 25 tanks of acetylene each month.

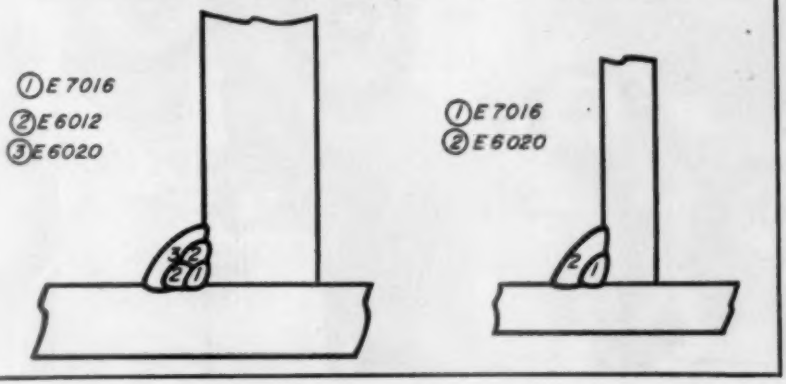
Since the company's products are fabricated primarily from low carbon steels, welding presents no great problem except where extremely heavy sections are welded. Since some of these sections run up to 11-inches thick, some cracking could occur when joining them without preheat. This tendency toward cracking is minimized by special multi-pass welding.

Precautions Prevent Cracking

In such cases root passes are first made with E7016 (low hydrogen-type) electrodes and then followed by passes with E6012 and final single or side by side pass with E6020 electrodes. With thinner sections the low hydrogen root pass is followed by one pass with E6020 electrode.

With standard low carbon steel plates, single pass welding is the usual procedure using either E6012 or E6020 electrodes. Weldments are designed with single pass butt joints wherever possible. Inside welds are intermittent except in tanks and sumps where water-tight

Low **hydrogen root passes** and multi-pass welds are used to prevent weld cracking when fabricating heavy steel plate without preheating.



joints are required. Outside welds are continuous to give good appearance.

Majority of welding is D-C and is done at 300, 400 or 500 amps depending on joint size and type and size of electrodes used.

Attention to Details

Since welded fabrication is not done on a production line set-up, careful attention is paid to all phases of preparation for welding, handling during and after welding, cleaning and finishing. This careful attention to detail makes it possible for the company to effect economies and offset some of the added cost of a custom weld set-up.

One phase which receives closest attention is flame cutting of component parts. In laying out parts, sheet metal templates are used to speed work when any sort of quantity is required. Machine tracing templates are used for parts that are repetitive. Layout is done on special layout tables, while previously laid out pieces are being cut on flame cutting machines. This set-up doesn't tie up machines as they would be if layout work were done on the tables of the flame cutting machines. All edge beveling for welding is done by flame cutting.

Small chipping hammer is used to remove slag and excess weld metal from all welded machine handles.

Pneumatic grinders and cup-shaped wheels are used for weld finishing.

UNITED'S PHOSON BRAZED JOINTS

for **Pressure Piping** Mean Continual Trouble-free Operation at

Manhattan House

New York Life Insurance Co.'s Modern 20-Story Apartment in New York City

Here is proof positive of PHOSON'S dependable, low-cost efficiency!

Engineering specifications for Manhattan House specified all joints be brazed between copper tubing and threadless wrought copper fittings and cast bronze valves for the forced hot water heating system to be operated at 115 PSI at a temperature of 240°.

Brazed joints were specified to assure strong non-corrosive permanently safe construction . . . and PHOSON was specified because it had the highly dependable physical properties so necessary and the joints could be brazed rapidly and at low cost!

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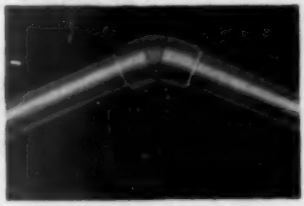

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Brazing minimized machining on this jaw contact assembly. Arms of copper bar stock are brazed into slots in easy-to-machine copper-zinc alloy. Units are grouped on a holding fixture so five can be brazed in single operation.

Silver Brazing Speeds

by Charles P. Berka
Associate Editor, Industry and Welding

Torch brazing of copper alloys eliminates tricky casting and minimizes machining without reducing strength or electrical conductivity.

SPRING and jaw contact assemblies, tee and elbow sections of electrical conductors that are used for both outdoor and indoor switch-gear and similar pieces of electrical equipment made by R. & I. E. Equipment Division of the I.T.E. Circuit Breaker Co., Greensburg, Penna., are cast from electrolytic copper to secure maximum electrical conductivity.

But, it's not just that simple. Units are generally too intricate to cast as a single unit; in addition, electrolytic copper is a difficult metal to cast. Different grades of copper often required in a single part also prevent use of castings.

Bulky, intricate beryllium-copper casting with low electrical conductivity was eliminated by change to silver brazed five-piece assembly. Four pure copper contacts are joined to beryllium-cobalt-copper spring casting by two operators using preplaced .004-inch silver brazing alloy strip.

Fabrication of Copper Assemblies

Brazed copper assemblies are the simple solution to these production problems. Easily made by brazing with low temperature silver brazing alloys, assemblies offer flexibility of design without sacrifice of strength and/or electrical conductivity.

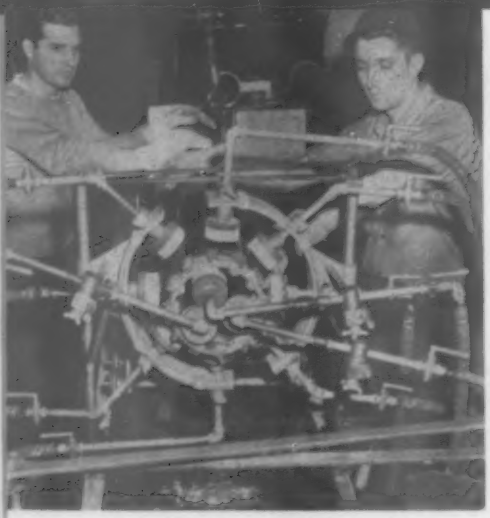
Here are some examples of the use of silver brazing.

Single beryllium castings had been used for spring contact assemblies, but had low electrical conductivity. Theoretically, this meant that four contact castings had to be twice as large as copper contact castings because their electrical conductivity was only about half that of copper. As a result, castings were larger and more expensive. In addition, shape of the unit, in which contact slugs are at right angles to the contact spring, made casting in a single piece difficult.

Braze Two Grades of Copper

The solution was to cast copper contacts from pure copper for maximum (85 per cent) conductivity. This conductivity was then further increased by brazing fine silver overlays to the copper contacts. Contacts were then brazed to beryllium-cobalt-copper contact spring casting.

Castings are first machined at



Using radiant burners for heat, and special fixture for positioning, as many as 24 each of brass nuts and fine silver contacts are brazed to electrical conductors in single operation.

Cast copper tee section is joined to copper tubing in protractor-type fixture which insures proper angles. After fluxing, $\frac{1}{16}$-inch diameter preformed silver brazing wire is positioned in machined groove and heated till it flows at 1170° F.

braze area and fluxed. After .004-inch thick silver brazing alloy strip is preplaced, units are assembled in fixture. Two operators then go to work. One preheats while the other brazes, adding additional brazing alloys to fillets as required. Low temperature silver brazing alloy used flows at 1170° F.

Containing ½-percent beryllium and 2½-percent cobalt, the copper contact spring is heat treated for increased strength, its tensile strength being increased to 90,000 psi. The casting has 45 percent electrical conductivity which is considered satisfactory.

Brazing Minimizes Machining

Jaw contact assemblies for disconnect switches can be cast but present a difficult machining operation.

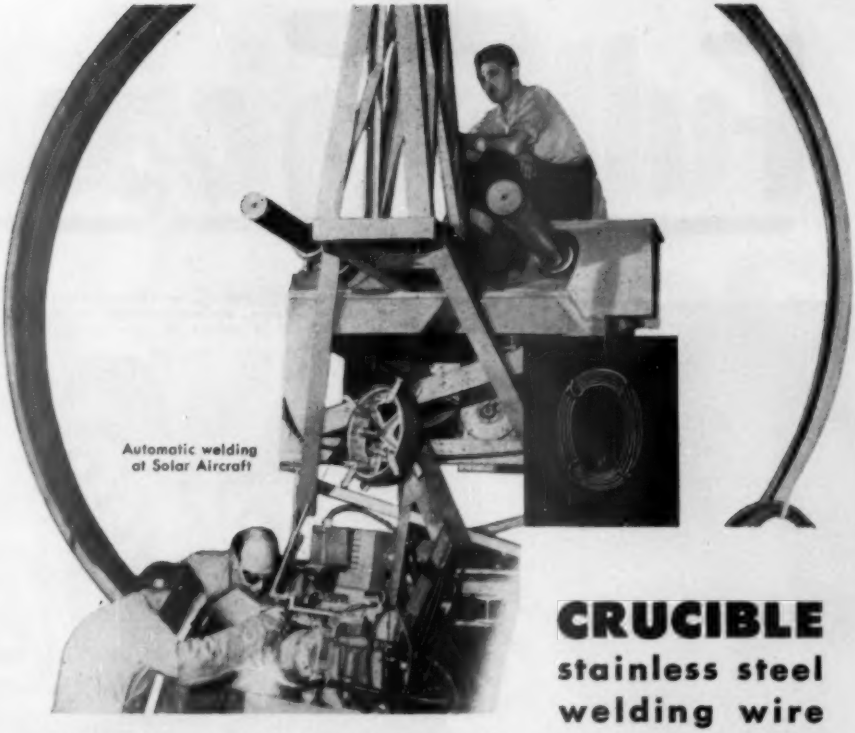
The solution is to cast only the base part, making arms from copper bar stock. Then only the base need be machined. Since pure copper is difficult to machine, a copper-zinc alloy is substituted for the base to secure better machinability. The copper-zinc base casting also increased strength of the part. This gave better physical properties without affecting the electrical performance of the device.

Machined surfaces are cleaned and parts fluxed. In assembling, copper bar stock is placed into machined slots and held in place by prick punching. Parts are then grouped on a holding fixture so that five units can be brazed at one time. Units are joined with $\frac{1}{16}$-inch diameter silver brazing alloy which flows at 1170° F.

Braze Castings to Tubing

Brazed joints give both desired physical and electrical characteristics in joining cast copper tee and elbow sections in electrical con-

(Continued on Page 106)



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stainless steel welding wire
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Save time and money . . . get better weldments with Crucible stainless steel welding wire. For Crucible welding wire is made by *steelmen* for optimum performance on the job.

You can get these superior welding wires for any type of automatic welding . . . in most stainless grades and sizes . . . and in spools, coils and cut lengths.

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CRUCIBLE first name in special purpose steels

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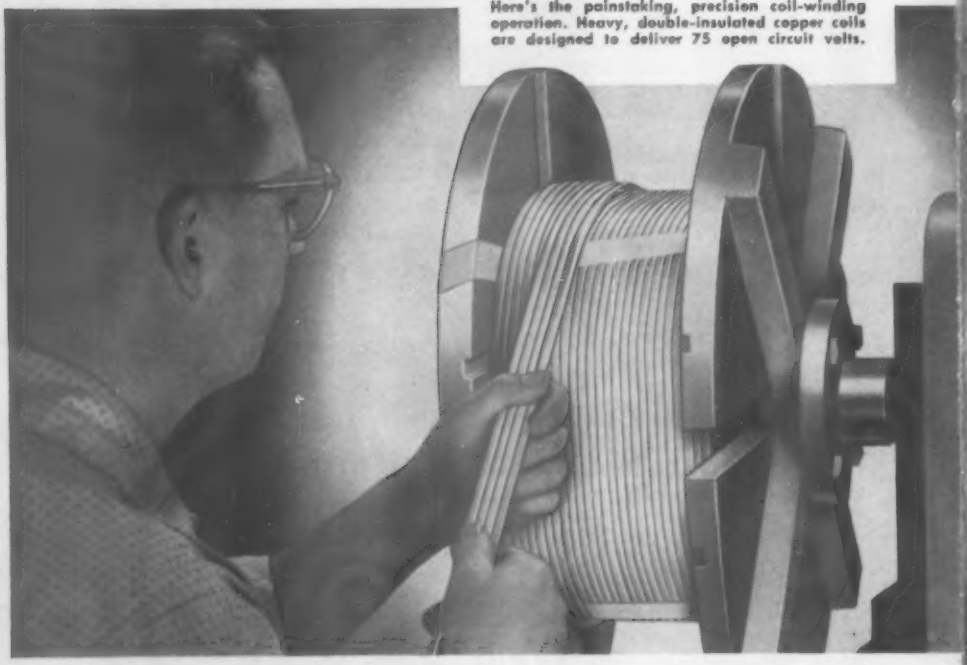
Full 75 open



Here's the painstaking, precision coil-winding operation. Heavy, double-insulated copper coils are designed to deliver 75 open circuit volts.

Precision-wound coils of extra-heavy copper combine with good design to give you all this —

75 open circuit volts for wider working range! Welding is much faster, far easier, even in vertical and horizontal positions. No more pop-outs with low hydrogen electrodes.

75 open circuit volts for more work done! Yes, more production on every shift. Arc action is faster and smoother at all current settings.

75 open circuit volts for better welding quality! Your men can realize all their skill. Far fewer rejects to hamper productivity.

75 open circuit volts for welder satisfaction! Operators are happier, more efficient . . . because they can work fast, work better.

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circuit volts

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• Low temperature rise (just 55° C) for longer machine life offered by A. O. Smith Heavy Duty a-c welder. Precision coil winding of extra-heavy copper combines with high-velocity ventilation and sound machine design to limit temperature rise . . . to make your welder last almost twice as long as other welders.

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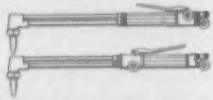
NO JOB TOO HOT ...OR TOO TOUGH

for these cutting torches!

VICTOR'S NEW
Series 1000
Series 1100
CUTTING TORCHES



CHOICE OF LEVER POSITION . . . cutting oxygen lever pivots from top rear of handle on Series 1000; from top front on Series 1100. Both Underwriters' approved. Available with 45°, 75°, 90° or 180° heads, to take all VICTOR standard-type tips.

LICK YOUR HOTTEST JOBS without a flashback . . solid stainless steel mixing tube absorbs heat slowly, keeps gases below flashpoint.

LAST LONGER UNDER ROUGH, TOUGH USE because they're made of toughest materials . . . special heat resisting bronze heads, stainless steel tubes, forged brass bodies.

EASIER TO HANDLE, EASIER TO MAINTAIN . . . hand-fitting oval shaped bodies, perfect balance give precise control. Design is simplicity itself; you can take either model apart completely, then reassemble it, all in less than 5 minutes!

Make your tough jobs easy, your easy jobs a pleasure — see your VICTOR dealer now!

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Mfrs. of welding & cutting equipment; hardfacing rods; blasting nozzles.

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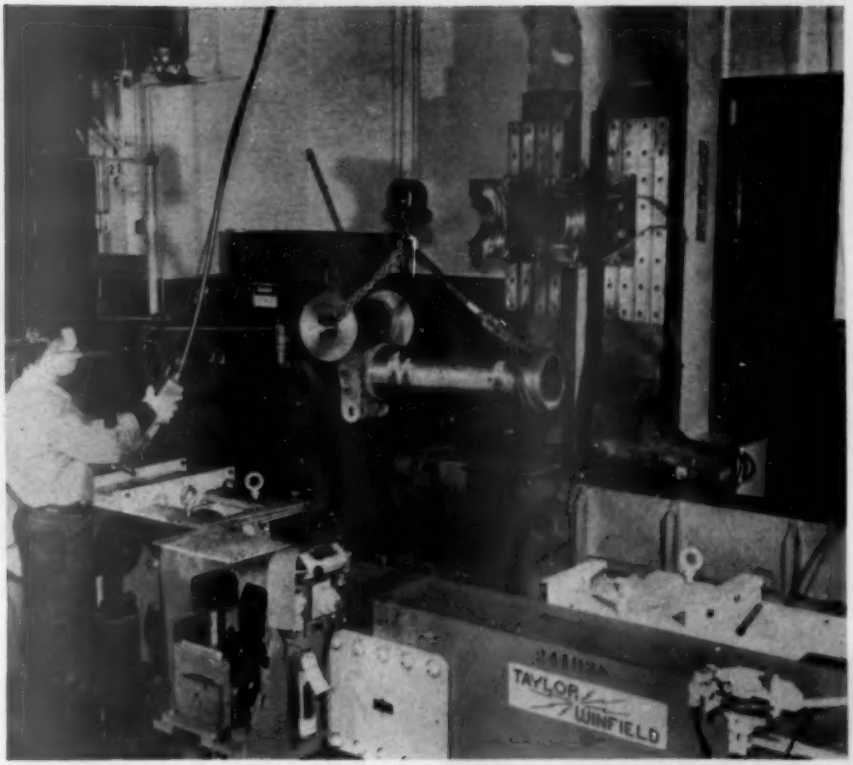


Largest flash butt welder in aircraft industry is used by Cleveland Pneumatic Tool Co. to manufacture large aircraft landing gear from chrome-moly forgings.

Giant Flash Butt Welder Joins 20" Diameter Alloy Steel Tubing

IN order to manufacture increased sizes of aircraft landing gear required by larger and larger military and commercial aircraft, the Cleveland Pneumatic Tool Company of Cleveland, Ohio, needed a flash butt welder much larger than any they normally use.

Specifications for such a welder included 1,000,000 lbs. of upsetting and forging force; electrical power demand of 4,000,000 volt-amperes;

In 108 seconds

flash butt welder joins

up to 100 square inches

welded cross-section

of low carbon steel

or 67 square inches

of chrome-moly forgings . . .

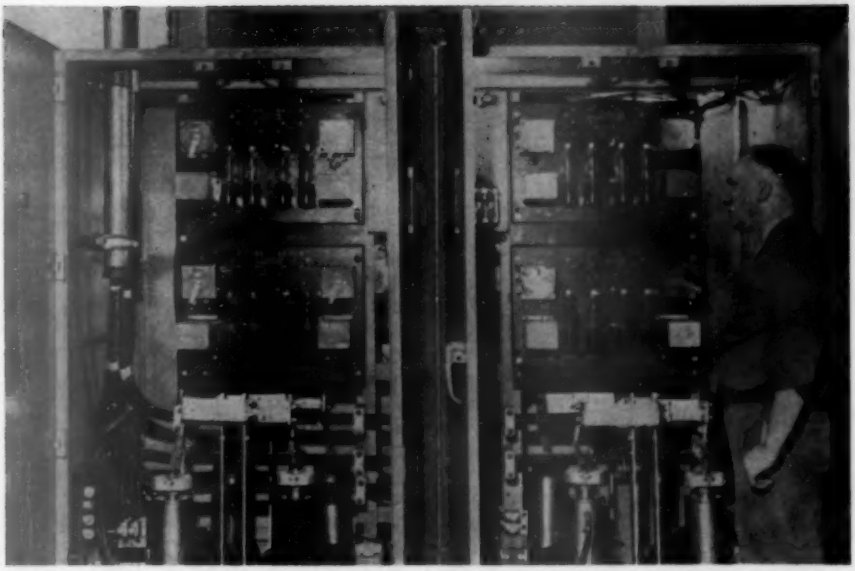
Constant operator control is insured by control benchboard. Corrections are made as welding operation progresses.

1,600,000 volt-ampere transformer rating; 20-inch diameter of tubular work and machine clearances for parts much larger than any currently in existence.

Although such a flash butt welder had never before been designed, Cleveland Pneumatic, together with Taylor-Winfield Corporation, who had built the smaller 250, 400 and 800 KVA welders being used

---

Typical weldment is this aircraft landing gear strut for Douglas C-124. Pre-machined forgings are flash-butt welded in two places, each a tubular section 7¾-inches outside diameter by ¾-inch wall thickness.



Giant electronic tubes provide exact control of electrical currents. Cabinet houses eight ignitron tubes and other necessary electrical and electronic equipment. Precise limits are necessary to insure sound welds.

by CPT, finally developed a suitable machine. After lengthy and careful design and manufacturing, the two companies put the giant machine into production.

Aircraft landing gear welded in the machine are made of materials, such as SAE 4340 steel (MIL-S-5000) heat treated for strengths of 180,000 to 280,000 psi. The most exacting process controls are used in selecting, welding, heat-treating and testing these assemblies. The flash butt welded joint has a dependably high strength when compared with physical properties of the parent metal.

In only 108 seconds, the machine welds two tubular alloy-steel parts, 19 square inches of cross section, into a single length. To do the same job by manual welding would require two men working 10 hours. A maximum of 100 square inches of welded cross section of low carbon steel or 67 square inches of landing gear steel can be joined simultaneously.

The massive machine is installed on a heavy foundation in the basement below the first floor welding department. This depresses the welder into the welding department floor for ready access by operators when loading the machine. Large, hydraulically operated clamping arms, which carry upper dies, raise to rear of machine—out

Manual welding would take two men 10 hours . . .

of the way—when loading and unloading.

Two welder transformers are individually connected to the upper and lower dies to equally distribute current around the large tubular work. These transformers operate from a 2300 volt power supply system. An auto-transformer varies the welder transformer primary voltage, with vernier voltage adjustment performed electronically.

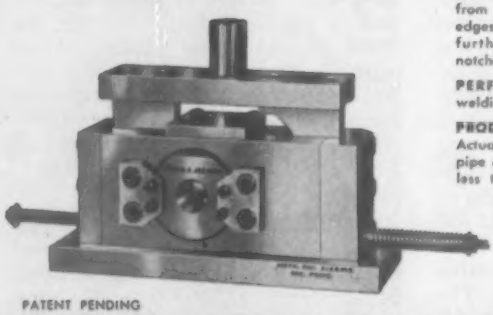
A load-cell built into the welder structure permits measuring the force applied by the main hydraulic forging cylinder. Control over flashing and upsetting platen motion is through a T.W. "follow-valve". Flashing voltage and current are controlled by patented "multiple voltage" system.

Built into the end of the welder opposite the upsetting end is a heavy hydraulic internal broaching mechanism. A broaching head on a broaching shaft is inside the open end tubular work with the head near the weld and the shaft connected to the hydraulic broaching cylinder. Immediately upon completion of weld upsetting and forging, the broach head is automatically driven forward to shear off the internal upset metal near the inner surface of the tubing. A piercing nose just ahead of the cutting edge of the broach breaks through the accumulated internal flash. This

NOTCH

THESE ENDS WITH ONE STROKE OF PUNCH PRESS

ARC-FIT TWIN NOTCH



PATENT PENDING

NO DEFORMATION Shears from inside out—cuts clean edges; eliminates need for further finishing; aligns notches automatically.

PERFECT "T" Joints for welding or brazing.

PRODUCTION NOTCHING Actual production time per pipe or tube end reduced to less than 3 seconds.

INTERCHANGEABLE Punches and dies up to 2½" O.D. pipe or tube for STANDARD TWIN NOTCH. (Special units available up to 3" O.D.)

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clearing out of flash and internal hot broaching of the weld saves many hours and dollars involved in conventional cold machining.

A large bank of hydraulic accumulators provides the high pressure, high volume oil needed for this fast and powerful broaching operation.

Giant electronic tubes provide exact control of electrical currents within the precise limits necessary to make sound welds of every type. The control cabinet houses 8 Ignitron tubes and other electronic and electrical equipment.

A control benchboard gives operator constant control over the entire operation. Corrections and deviations can be made immediately as the weld progresses. A recording instrument supplies a permanent record of controlled variables to provide data for future welds.

CIRCUIT MAINTENANCE . . .

(Continued from Page 41)

weld. The rod is then arc welded to the plate, a loop is tacked on, and this is pressed against the cable as an additional support to prevent flexing and possible broken strands. The result is a 100% efficient electrical connection between the welding machine and weldment.

In contrast to the former method of drilling holes for mechanical clamp type lugs, this procedure has resulted in a 300% increase in the life of the plate, now fabricated at about two-thirds of previous cost.

Electrode Holders

Because of Caterpillar's success with 100% welded copper circuit connections, it was decided to follow the same procedure in the case of electrode holders.

Several types of holders were tried and rejected for various reasons, primarily because they were

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ON MARKET'S MOST VERSATILE

1-ROD MAINTENANCE DEPARTMENT

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No. 11

NICKEL-SILVER BRAZING ROD

BRAZES 14 METALS . . .

HAS THESE MANY INCOMPARABLE CHARACTERISTICS

Tensile Strength, 85,000 psi.
Shear Strength, 160,000 psi.
Elongation in 2", 12.0%
Brinell Hardness, 180
Flows Like Silver Solder
Resists Wear 5 times Better Than Steel
Bonds at 1450 F.
Takes Less Heat
Takes Less Preparation
Takes Less Cleaning
Finishes Jobs Faster

A LITTLE DOES A LOT MORE

No. 11 Costs Less Per Job
No. 11 Goes Further—Usually 3 times
No. 11 Saves Gases—Up To 50%
No. 11 Saves Time —Up To 60%
No. 11 Saves Dismantling
No. 11 Saves Reassembly

Comes Bare and Flux Coated
Sold by 700 All-State Distributors

SEND FOR Complete Application Instructions

ALL-STATE WELDING ALLOYS CO. INC.

WHITE PLAINS, N. Y.

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not easily adaptable to the welded cable connections.

Electrode holders, with a solid copper connection, manufactured and marketed by the same company that provides the thermit-type copper welding equipment and materials, were finally selected. By early 1955 the use of this holder will be standard procedure in all Caterpillar welding shops.

As a result of this standardization program, with the new type holders, costing about the same as conventional types in 300 and 500 amp sizes, overall costs of holder maintenance have been drastically reduced. The practice of using two holders alternately, to allow cooling, has been eliminated — and water buckets for cooling holders have been completely discarded.

Summary

There are about 700 welding machines in regular operation in the Peoria plant of Caterpillar. Each machine requires from 60 ft. to 250 ft. of cable. About 60 ft. is most common, with half on the electrode side, half on the ground side.

All welding circuit repairs are made at a central maintenance shop rather than on the job. If an emergency arises, such as cut cable, part breakdown, etc., a spare (whip or entire lead) is furnished from the maintenance shop and the damaged item returned for repair. Most of these "whips" remain in service until cable life is completely gone.

It is neither economical nor efficient to send maintenance men on "fire alarm" calls to make repairs. They would be forced to stop working on their currently scheduled jobs. In addition, the production welding operator would be idle and additional overhead for down-time would add to maintenance costs. These costs turn into savings by the "spare" program.

Because the cost of equipment necessary to conduct a program of this kind is moderate, within the scope of most operations, it could easily be adopted by other shops.

The elimination of so many quality and cost problems is well worth the investment even for welding departments where considerably fewer welding machines are used. Considering the investment in circuits and equipment, many manufacturers' welding departments can profitably adopt most of the features of this program.

Biggest Heads Ever Spun

These biggest heads ever spun are going to be used just once—to test penstocks for the Littleton, N. H. hydro-electric development of the Connecticut River Power Co. Measuring 21 ft. 8½ in. in diameter four of these giants of 1¼-in. steel were spun on Lukens Steel Company's 276-in. flanging machine in Coatesville, Pa., for the Walsh Holyoke Fabricators Division of Continental Copper & Steel

Industries, Inc., Holyoke, Mass. Because of their size, they posed a shipping problem. This was overcome by flame-cutting them in half after they were completed, and shipping them in two pieces by flatcar to Holyoke, where they were reassembled.

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D.C. WELDERS with PULSATING DIRECT CURRENT

Pulsating direct current transfers *more* metal at a given current setting—and as a *spray*, rather than in globules, insuring fine grain structure and sound, dense welds with excellent physical characteristics. These smooth, uniform pulses minimize magnetic arc blow, permit a shorter, more efficient arc. Each Miller SR model has the range of two or more common D.C. welders—without need for "gadgets." Reacts 100 times faster to voltage drops; an instant pulse of current keeps the weld bead free of interruption. Low, low maintenance, for the SR has no mechanical parts to wear or break. Instant polarity reversal switch. Can be paralleled in any combination with other SRs; a variety of remote controls are available. Automatic and other specialized applications are duck soup for the SR! 200, 300, 400 and 600 ampere models.

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Write or phone us for details NOW!

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ELECTRIC MANUFACTURING COMPANY Inc. • Appleton, Wisconsin

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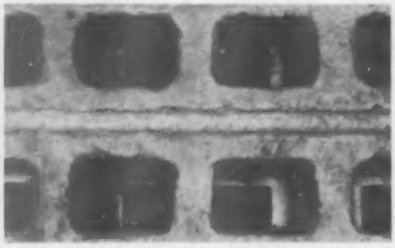
Easy Repair Welding — A bus company builds up worn valve seats of old engines with NI-ROD® electrodes. The company's maintenance chief says welding cast iron "heads" with NI-ROD is quick and easy. Cuts their costs, too.

Valve Seat built up with NI-ROD is remachined. Then it's as good as new! Thanks to NI-ROD's operability it is easy to get *sound machinable welds in cast iron* . . . even for welders of limited experience.

Easy Production Welding — For a shakeout deck, a Michigan foundry joined heavy Ductile Iron sections with NI-ROD "55"® electrodes. The foundry welded Ductile Iron to itself and to steel framing with NI-ROD "55".



Here's a close-up of the NI-ROD "55" weld joint in the two main deck castings. *No preheat or postheat was used.* Yet the weld is crack-free, despite terrific battering . . . *proof you get sound welds easily with NI-ROD "55"!*

"Cast iron" proof that Ni-Rod is the easy way to weld cast irons

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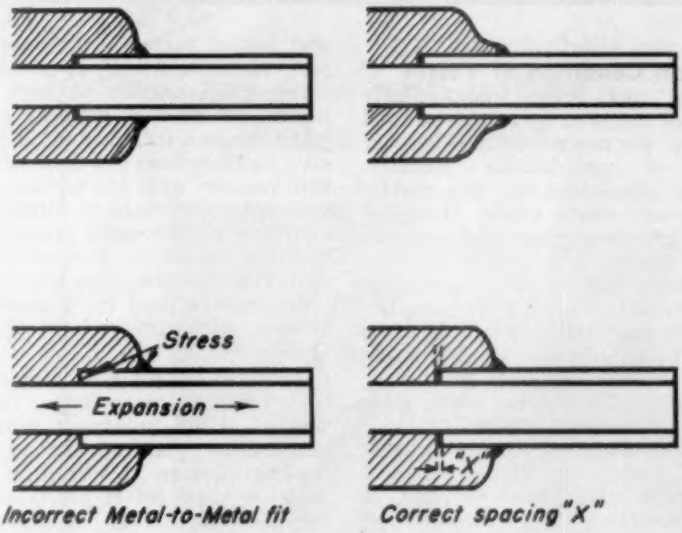


Upper: Two valve types welded with socket joints. In systems carrying corrosive products, this joint type keeps corrosive out of contact with weld. **Lower:** Pipe ends should not butt against socket seat. Allowance must be made for expansion and stresses during welding.

Correct Techniques Are Important

HIGH alloy valves, prepared for welding, are preferred for many applications in process piping because they offer the advantages of easy, time-saving installation and lasting trouble-free joints. Continued advances in chemical process industries require the handling of highly corrosive intermediate and end products at elevated temperatures and pressures. High alloy valves meet such problems and welding makes them easier to install.

Numerous types of stainless steel, monel, nickel and other alloy valves are available for welding. With attention to a few details, prefabricated or field piping, with "weld-end" valves, can be pro-

duced with excellent results.

Physical Condition of Valves

Some cast bodies, particularly those of non-ferrous material will contain shrinkage cracks and/or areas of considerable porosity. Careful inspection for this condition is well worth while. If superficial grinding does not remove visible flaws, it is unwise to proceed with fabrication. Expansion and stresses caused by welding accentuate the condition and, in some cases, have actually caused valve bodies to leak. Even if tests after fabrication disclose no leaks, conditions of service might.

Special attention to surface condition should be given to pure nickel and monel body castings, as they may have a greater inclination toward porosity and cracks than stainless steel and Hastalloy. In order to give the welded equipment a fair chance, it is wise to inspect the material for soundness before use.

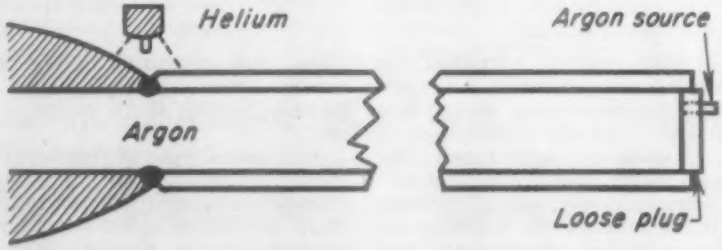
Temperature Considerations

Since valves are actually instruments, with carefully machined and lapped surfaces, they are subject to destructive distortion by careless application of high temperatures. Heat of welding can be kept low and localized. If a corrosive medium does not come directly into contact with the welded joint, one light seal weld is often sufficient for a serviceable joint. Overwelding serves no purpose except to invite trouble. The socket-type valve can be used for a good joint with a minimum of heat application.

If the type joint or service requirements necessitate heavily welded joints, interpass temperature can be practiced, that is, allow cooling before continuing each pass. A slow jet of air is helpful for this purpose. If necessary, wet asbestos can be moulded around the valve body.

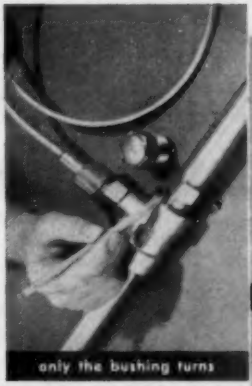
The valve itself should be completely closed, then backed off just enough to relieve the strain of the disc against the seat before any welding is attempted. In this manner, the valve gate and seat support each other, and no strain is

Butt joints provide system with unrestricted flow. With no pockets to collect residue, lines are easy to flush out. Illustration shows set up for inert-arc butt welding when argon purge is used.



compound Pressure

the new and better cylinder manifold...


only the bushing turns

threads do it

a very tight seat results

a simple wrench does the job

The new compound pressure* cylinder manifold is made of the sturdiest die forgings and extruded rods; all are drilled for uniform inner dimension. The leak proof joint which results from the compound pressure design is tighter and more leakproof even than the well understood and long used connection between regulator and cylinder valve. The big improvement of this new invention lies in these facts: you can have any competent mechanic assemble a cylinder manifold to your own or our specifications with the assurance of absolute alignment and permanent leak proofness. Yet, the resulting cylinder manifold may be disassembled at any time, stored or moved and reassembled when required. It may be extended when needed, redesigned when desired, stored in bins as individual fittings. Only the bushings move in assembly, thus absolute alignment is certain.

*patents applied for

by

National of ...california

NATIONAL welding equipment company... 218 fremont street san francisco 5 california

SSB-M

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The Inquiring Weldor

BY JOHN WILSON

Question: Have you been able to use "Eutectic Low Temperature Welding Alloys" successfully where you failed with other alloys?

Marvin Cutler, Dearborn, Mich. In motorcycle repair work, we very often find rear wheel chain sprockets with teeth broken off. Until I started using EutecRod 185FC, I had never been successful in finding an alloy that would hold up under the punishment that these sprockets take. With EutecRod 185FC, I can build up several teeth in a row showing only a slight redness in the metal. Then I grind the teeth to shape. The rebuilt gears outlast new ones, and cost a lot less than the replacement cost of $25 for new ones.

Question: What has been your experience with welding auto and truck springs?

Joseph Daddona, Waltham, Mass. Before I started using EutecTrodes, I tried to weld the main spring of a dump truck with another alloy. After being in use for two days, it snapped. On a similar job, I now vee out both sides of the leaf and use EutecTrode 680. It goes on at such low heat that the base metal is not affected. As a test, we tried to snap the welded leaf under a hydraulic press, but it stood up. "Low Amp" EutecTrodes have saved me and my customers lots of money, especially on cars and trucks for which parts are not carried in stock.

Question: Do you use many different "Eutectic Low Temperature Welding Alloys" in your work?

Louis A. Edwards, Flint, Mich. I own and operate a custom welding and saw repair shop. I use approximately 15 different EutecRods and EutecTrodes consistently with wonderful results. "Low Temp" EutecRod 16FC has been a big boost to my business in making difficult jobs easy. SteelTectic #1 works terrific for welding thin and dirty steels where ordinary electrodes would burn through. Eutectic "Low Heat Input" metal joining enables me to produce "Better, Faster, Cheaper" welding jobs.

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EUTECTIC LOW TEMPERATURE WELDING ALLOYS clear up welding headaches . . . minimize warping, distortion, stresses and embrittlement. For time and money saving help on welding steels, aluminum, cast iron . . . and all "problem" alloys at temperatures below base metal melting points . . . and for stronger, safer production and maintenance welding just write "Welding Data Bank" for your free copy of "1954 Welding Data File" on your jobs.
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EUTECTIC WELDING ALLOYS CORP.
40-40 172nd St. Flushing, N. Y.

Circle No. 41 on Reader Service Card.

exerted by the disc against the body.

Careful Joint Design

Butt and socket joints are the usual types used on weld-end valves. The socket joint is easy to weld and can be adapted to offer a good, tight joint with only one pass. The butt joint has the advantage of producing a smooth, unrestricted inside wall in a pipeline. Such a condition is desirable for handling corrosive materials, since it does not permit collection of the material in pockets which could otherwise be formed.

A butt joint, because of the elimination of such pockets, is also advantageous for handling lethal materials, and bacteria-affected products. The lines can be washed down easily and completely.

However, in order to gain the advantages offered by these joints, proper welding techniques are essential.

How to Make Welds

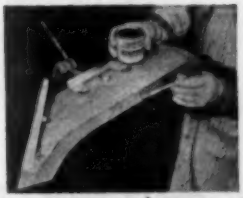
Proper set-up for a socket joint should include correct spacing to allow for expansion and stresses. This spacing should be carefully maintained. Weld failures have frequently resulted because the pipe end was fit flush against the seat of the socket in the valve end. Such a condition allows no relief for the expansion of the pipe, while the joint is being welded. As the pipe is expanded by the heat of welding, stress is collected at the welded joint. Resulting fine cracks can cause leaks. When spacing is provided, by drawing the pipe back approximately $\frac{1}{32}$-inch, expansion without stress occurs.

Alloy valves installed with butt welds are used for an unrestricted flow and to produce a line where there are no pockets to collect residue. Lethal, bacteria-affected or

Colmonoy Hard-Facing Increases Plowshare Life

Colmonoy Sweat-on Paste does a tremendous job resisting wear on the bottom edge of plowshares. The share shown plowed 1,400 Nebraska acres. When taken out of service, inspection showed that the Sweat-on Paste would be good for 700 to 900 more acres. An average of only 120 of these acres dulls an unprotected share beyond use.

No other material has better abrasion resistance than Sweat-on Paste. It's easy to apply too, requires no grinding, and covers three times the area covered by an equal weight of rod.



Sweat-on Paste being applied with a stiff brush to the bottom edge of a new share.

A 1/16" overlay of Wallex rod is applied to the share point. Colmonoy hard-face all new shares—it pays.

Write for Engineering Data Sheet No. 7 and 32, and Colmonoy Manual No. 77.

After air drying, the overlay is fused to the share with an oxy-acetylene flame.

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corrosive products can be handled by this type of line. To weld this type joint, either the inert arc or metallic arc welding processes should be used. The former has definite advantages, especially for root passes.

Inert Arc Welding

When using inert arc process both the valve-end and the pipe should be beveled with the standard 37½° bevel. The joint should be set up with no root spacing. The first pass is a fusion pass without the use of filler rod. (A thoriated tungsten electrode is best for this purpose.) As the root pass is being welded, the underside should be purged to provide the same shielding of inert gas as the top. Argon is usually used for purging because it's less costly than helium. (Nitrogen is also used for this purpose. See INDUSTRY & WELDING for August, 1954.)

The foregoing procedure, carried out by a capable operator, will yield a root pass that is as sound, regular and well fused as the outside crown.

After the all-important root pass, inert arc or conventional metal arc welding is optional. If large diameters or many joints are involved, metal arc is faster and cheaper so that a change of equipment might be profitable.

Metal Arc Welding

If the conventional metal arc process is the only method available for welding a butt joint between valve and pipe, special attention must be given to the root of the weld. If backing rings are

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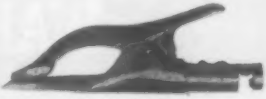

Model W-GC-3
300 Amp. Ground Clamp.

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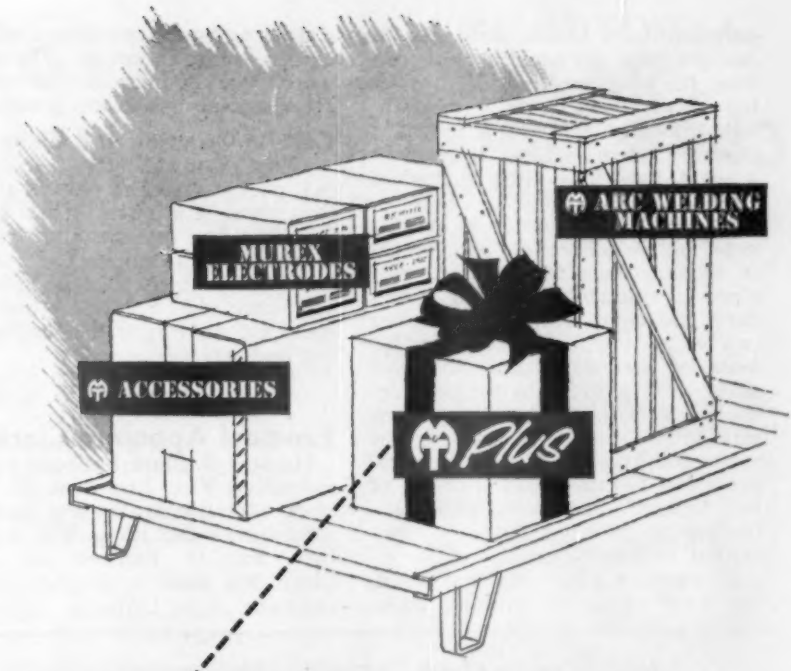

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permissible, a sound weld can be easily made. By welding onto the ring, the slag can be floated to the top where it can be removed without difficulty. Thorough interpass cleaning must be done to produce a weld free from slag inclusions and porosity.

Backing rings used in piping must be fit accurately and snugly in order to be effective. Carelessness in this detail leaves spaces through which slag and splatter can enter the line. This foreign material can work into the valve seat, scoring the moving parts of the valve. Nickel and monel valves, especially, are easily scored by such conditions. Many chemical processes require tight shut-off of the valves. Therefore, extra attention to backing rings is warranted in these cases.

If backing rings are not used, the root must be ground when using conventional metal arc equipment. Thorough cleaning would then be necessary to remove all material left from grinding.

Careful Grinding and Cleaning

When piping must be self-draining, pocket-free and free of all obstructions, it is obvious that backing rings are undesirable. The alternative of grinding the root of the weld requires careful grinding and cleaning. For these reasons, inert arc welding is the best welding method.

Fansteel Appoints Clark

Herbert B. Clark has been named executive Vice President of Fansteel Metallurgical Corp. and its subsidiaries including WW Alloys, Inc. Joining Fansteel in 1939, Clark has been a director of the company since 1951.

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AUTOMATIC HARDFACING

(Continued from Page 43)

attachment is another adaptation—multiple arc welding. Two small electrodes are used in place of a single larger one. The use of two electrodes spreads the arc and reduces penetration and the amount of admixture. Higher current used increases deposition rates.

The third new development used was an agglomerated hardfacing flux. The flux consists of small granules, each of which contains particles of alloying and fluxing materials so bonded that they will not separate. As a result of this bonding, concentration of fine materials or settling out of the alloy elements, that otherwise affect analyses of hardfacing deposits, is prevented.

Welding is done with mild steel electrodes through a layer of this flux, resulting in a deposit of high abrasion resistance. The hardfacing material is actually alloyed in the arc, the alloys being added through the flux. Fluxes can be varied to meet different service requirements.

Automatic hardfacing of the road scraper blades using these three new developments was done at 650-700 amps, 32-34 volts, with 24 oscillations per minute. Travel speed was 5 ipm for a 2¾-inch wide bead, using ⅛ welding wire. Direct saving by using hardfacing flux instead of hardfacing electrodes was 45 percent. Euclid reports indicate that the new hardfaced areas outlast the old ones by 200 percent.

Photos courtesy Lincoln Electric Co.

See Page 26 for easy INDEX to Welding Products

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"Difficult-to-weld" metals are said to be easy to join with a new bonding process. Based on the discovery that steel filler metal can be bonded to both ferrous and non-ferrous base metals, this . . .

New Process Combines Advantages of Fusion Welding and Brazing

A NEW METHOD of joining and building up metals and alloys has been developed by Uniworld Research Corporation of America. This process, known as "Weldbrazing," is said to utilize the advantages of both fusion welding and brazing while avoiding the disadvantages of both methods.

To obtain a better understanding of this new process it may be best to distinguish it from the conventional methods of fusion welding and brazing.

What Is Fusion Welding?

Fusion welding consists of heating a base metal locally to its melting point and then adding a molten filler metal, usually of similar composition, to the pool of molten base metal. From a metallurgical standpoint and depending upon the material welded, such factors as high welding heat, high heat input and unfavorable cooling rate can have a detrimental effect. This condition has been exemplified in the graphitization of steam lines in low carbon steels, the brittle structure obtained in the higher carbon steels, permanently spoiled structure in high manganese steels and reduced corrosion-resistance in stainless steels.

What About Brazing?

Brazing, which is done at a lower temperature than fusion welding, consists of heating the base metal at least to the melting point of a non-ferrous filler metal, but below its own melting point, and depositing the filler alloy without melting the base metal. The temperature of this operation is above 800°F. Disadvantages of brazing include restricted working temperature range, use of a filler metal with relatively low tensile strength and impossibility of welding large structures or long seams, since conventional brazing materials do not have sufficient strength when solidifying to absorb high stresses and deformations.

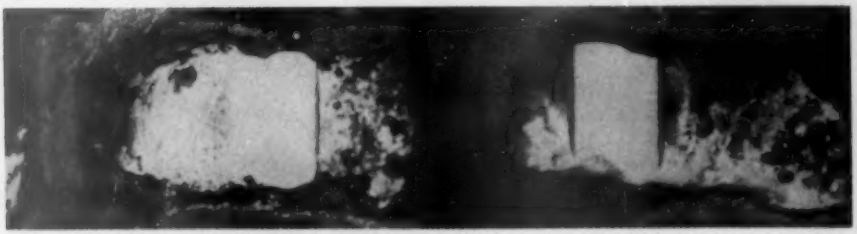
How "Weldbrazing" Works

This new process was developed with the primary objective of avoiding difficulties encountered in production welding and brazing

EDITOR'S NOTE

After 10 years of negotiation, Karl Spitz, vice president of Uniworld Research Corporation of America, recently received United States Patent for his "Weldbrazing"-Method.

Flow of 18:8 stainless steel weld metal is shown on .75 carbon steel plate. Because of high working temperature, there is some cracking through base and filler metal. Some porosity and brittle, non-machinable structure are visible.



Flow of weldbrazing alloy is shown on same high carbon steel plate. Lower working temperature is said to yield smooth surface, eliminate porosity and leave soft, ductile and machinable base metal.

and to provide a method for joining materials previously "difficult-to-weld" or "non-weldable" with conventional methods. This "Weldbrazing" Method is said to be based on the discovery that a steel filler metal can be non-fusion bonded to both ferrous and non-ferrous base metals. This is done by creating on the base metal intermediary alloy zones of lower melting and surface tension reducing elements of high fluidity prior to or with the deposition of the molten steel filler metal. The resultant alloy phases have high affinity for both base metal and filler which they bond together at a temperature below the melting point of the base metal.

The bonding temperature, which may vary within wide ranges, is dependent upon the base metal and the properties which are required in the "weldbraze" layer. These layers, which generally have an iron content of more than 50 percent, will vary both in physical and chemical characteristics depending upon the "weldbraze" filler rod selected.

Joins Various Materials

Iron, steel, cast iron, copper, brass, bronze, nickel and other metals and alloys in similar or dissimilar combinations can be "weldbrazed" without actual fusion of base metal.

In some cases the process turns the tables on brazing: when brazing steel the base metal is ferrous,

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Soft, normalized base steel is evident in photomicrograph of a cross section through weldbrazed layer on high carbon steel plate etched with picric acid.

Improved corrosion resistance is said to be evident in photomicrograph of cross section of weldbrazed layer in 18:8 stainless steel.

the filler non-ferrous. When "weldbrazing" non-ferrous base metals, the filler is ferrous. Consequently, the role of base and filler metal is reversed.

Actually, "weldbrazing" is said to be a method of joining and building up ferrous and non-ferrous metals and alloys at working temperatures below that of conventional fusion welding by means of layers of alloy steel composition.

The physical properties claimed for different "weldbraze" layers include tensile strengths up to 130,000 psi, elongation up to 60 percent, hardness up to Rockwell 76C, good wear resistance and resistance to corrosion by chemicals and acids.

The new process operates within the working temperature range of fusion welding and brazing and makes possible lower heat input which amounts to savings of from 25 to 50 percent as compared to that necessary for fusion welding. As a consequence, it is claimed that this new process will lessen stresses, warping and permanent deformation of the structure in the "weldbraze" and heat affected zones. Another advantage claimed is that the process performs very easily because of its extended working temperature range.

Weldbrazing is said to be applicable to all types of oxy-acetylene and electric welding with standard equipment.

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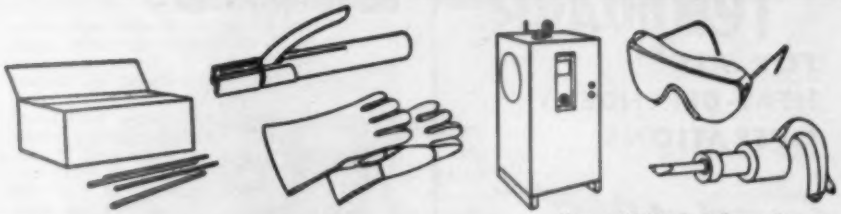
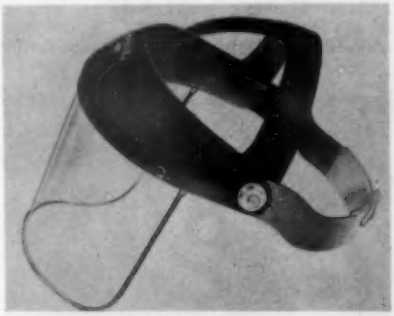


new products

For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.

Face Shield

A face shield which gives operator a choice of a variety of windows is announced by Fibre-Metal Products Co. Said to be light in weight and comfortable, the shield has an adjustable head



band section with genuine leather sweat band. All-purpose windows and windows for gas welding and scarfing are available with snap fasteners for quick removal.

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Weldable Sealer and Paint Primer

An anti-corrosive paint primer manufactured by Industrial Metal Protectives, Inc., is said to permit welding of the painted part immediately or several hours after painting. Called a weldable primer, it can be applied with a brush or sprayed.

A companion product announced is a non-flammable, weldable sealer material.

Circle No. 113 on Reader Service Card.

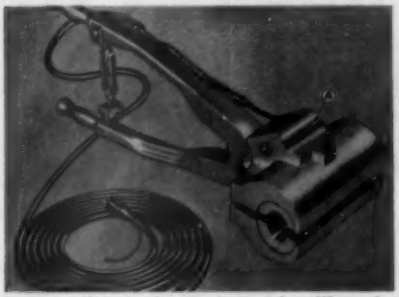
Contour Machine for Seam Welding Wheels

Precision machine contouring of seam welding wheels can be done with the new Pro-Tracer marketed by U. S. Tool and Engineering Corp. Used for machine contouring of copper electrode wheels, the unit uses a metal template and a tracing device to guide a tool bit. A single tool bit with an 80° included angle and ⅛-inch tip radius gives more of a shearing action and will machine copper seam welding wheels, accurately controlling the amount of metal being removed and yielding the desired finish.

Circle No. 114 on Reader Service Card.

Portable Vulcanizer

A portable vulcanizing iron for repair of cable offers interchangeable molds for various cable sizes. Pilot lights show when current is on and when warm up period is over. Vulcanizer is designed



for on the spot repairs and will make patches and repairs up to 8 inches in length. Lightweight and durability are said to be additional features of the unit marketed by Joy Mfg. Co.

Circle No. 115 on Reader Service Card.

Tempilstik°

FOR ALL HEAT-DEPENDENT OPERATIONS

looks like a crayon... marks like a crayon... tells temperatures like a precision instrument!

Sixty-three different compositions enable you to determine and control working temperatures from 113° to 2000° F. TEMPILSTIK° marks on workpiece "say when" by melting at stated temperatures—plus or minus 1%.

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132 WEST 22ND STREET
NEW YORK 11, N. Y.

Visit our booth No. 323, Western Metal Congress & Exposition, March 28-April 1, Los Angeles.

Circle No. 50 on Reader Service Card.

DC Rectifier Welder

A 300-amp selenium rectifier-type welder is announced by Hobart Bros. Co. A five range control switch and a rheostat are said to provide a current range of 35-425 amps for use with a wide assortment of electrodes. A welded core of electrical steel and the absence of a moving iron core or adjustable air gaps assures quiet operation.

Circle No. 116 on Reader Service Card.

Lens Material and Color Frames for Safety Glasses

Attractive color frames and a new plastic lens material for corrective safety glasses is being marketed by United States Safety Service Co. under the trade name "Styl-Ize". According to the manufacturer, these lenses are stronger and lighter and provide better light

transmission and greater scratch resistance.

Available in a variety of shapes and colors for men and women, the frames are non-inflammable and non sparking and can be supplied in individual corrective prescriptions.

Circle No. 117 on Reader Service Card.

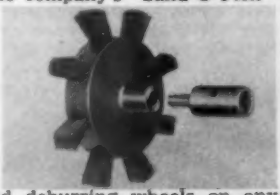
Cutting Torches

Two new cutting torches for oxy-acetylene and oxy-propane operation have been introduced by Universal Cutting and Welding Equipment Co. Torches feature forged head and rear body and stainless steel ball-type valves for positive seat and long wear. According to the manufacturer, torches are tough and durable, yet light and easy to handle.

Circle No. 118 on Reader Service Card.

Adaptors for Deburring Wheels

An adaptor announced by Merit Products, Inc. is said to make it possible to use the company's "Sand-O-Flex" brush



backed deburring wheels on any shaft up to 1¼" diameter. Adaptors are available for plain or threaded spindles. No other mounting is necessary.

Circle No. 119 on Reader Service Card.

Hard Facing Electrode

A new hard facing electrode is said to be especially suited for rebuilding equipment requiring high resistance to impact, severe abrasion, shock or high corrosion. According to the manufacturer, a new alloy balance permits a smoother flowing deposit, softer arc with a minimum of porosity. Available in two sizes only, 5/32" and ¼" from Mir-O-Col Alloy Co.

Circle No. 120 on Reader Service Card.

Heavy Duty Tubes

A group of tubes designed for a wide variety of industrial uses where shock and vibration resistance is a factor has been developed by Amperex Electronic Corp. Said to offer uniform operation, the tubes have a guaranteed life of 10,000 hours.

Circle No. 121 on Reader Service Card.

New Package

New can labels for "Protect-O-Metal" have been brought out by G. W. Smith & Sons, manufacturers of the non-toxic,

non-inflammable anti-spatter compounds. New label gives complete application instructions.

Circle No. 122 on Reader Service Card.

If all the INDEPENDENT Acetylene CYLINDERS

we have built were filled at one time they would hold more than

60,000,000

cu. ft. of gas!

Furthermore, Independent Acetylene Cylinders hold from 5 to 10% more gas, and the uniformity of the monolithic filler insures even distribution of acetone. Oxygen storage cylinders available in 12 ft. & 20 ft. lengths; capacities 850 and 1500 cu. ft.

10 C.F. 40 C.F. 60 C.F. 100 C.F. 150 C.F. 250 C.F. 300 C.F. 340 C.F

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PREHEATING • POST HEATING • THAWING

GENERAL HEATING • PIPE BENDING

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Ransome RUT Torch

with LP or natural gas

With this torch either gas produces large, hot, extremely stable flame—even in high wind. Built as hand torch; adapts with homemade brackets to stationary use. Weighs only 3¼ lbs.; 32¾" long; copper bronze head. Burns 50 minutes on 1 gal. LP-Gas at 10 p.s.i. Natural gas, minimum requirement 1 p.s.i. Order NOW... only $14.50 f.o.b. factory. Specify whether for natural or LP-Gas.

Dealer inquiries invited. 44

RANSOME COMPANY

Liquified Petroleum Gas Division

Room L-4 4030 Hollis St., Emeryville, Calif.

Circle No. 37 on Reader Service Card.

Cast Iron Electrode

A non-machinable cast iron electrode designed for repair where finish may be ground or left as welded has been introduced by All-State Welding Alloys Co. The electrode, applicable with AC or DC welders, is said to give dense, sound welds in all positions.

Circle No. 124 on Reader Service Card.

Portable Grinder

Weighing only 4½ pounds "Nedco Jr." can be operated with one hand, according to its manufacturer, Nedco Co. De-

signed for use in hard to reach spots, it uses 4" or smaller abrasive discs with or without adjustable guard, and has a spindle speed of 10,000 rpm. Spindle is threaded for use with drill chuck.

Circle No. 125 on Reader Service Card.

Eyeglass Protector

A new safety clip-on introduced by Watchemoket Optical Co. is said to provide shatterproof lenses in a light, unbreakable frame of durable plastic.

Known as "Tuc-Overs", they snap on or off prescription frames of all types easily, and are held in place by plastic clips. This new safety aid prevents damage to prescription lenses and can be used with shatterproof green lenses to cut out glare. Over-eyes protection is provided by a visor.

Circle No. 123 on Reader Service Card.

Spot Arc Welder

A spot arc welder unit developed by Mid-States Welder Mfg. Co. is said to be ideal for spot welding where only one side of the work is accessible. The arc is formed between a tungsten electrode and the

work piece shielded by an inert gas atmosphere. Time of the arc is limited so that only a puddle of molten metal is formed, much like that yielded in conventional spot welding. The unit can also be used for normal arc or inert gas shielded welding.

Circle No. 126 on Reader Service Card.

Gun Type Heat Tool

A trigger-controlled gun for soldering, brazing and pre-heating is being marketed by Fire Gun Sales Corp. Operated on propane, the gun is said to provide heat without carbon deposit. Kit contains concentrator tip, blow torch tip, soldering iron tip, hose regulator, gauge and carrying case.

Circle No. 127 on Reader Service Card.

Soapstone Holder

A soapstone holder said to protect the marking material from breaking and to enable the operator to use short ends is

available from Atlas Welding Accessories Co. Holder is rigid metal with spring clip for carrying in the pocket. A button slide readily expels the soapstone as it wears down.

Circle No. 128 on Reader Service Card.

THIS IS BASIC

The bitterness of poor quality lingers long after the sweetness of low price is forgotten.

It is to your best interest never to forget that there is no Santa Claus in the RESISTANCE WELDING ELECTRODE business.

Whenever price is CUT, quality is CUT! The reasons given you for price cutting are those the price cutter wants you to hear. That is the time to beware, because substitutions can be made in tip manufacture that cut cost and quality, yet are not apparent in the finished product until it is used.

No one can do business long without a profit. When a tip price is CUT, something is taken out. That something is QUALITY . . . and its loss will be in proportion to the price cut. If you buy cut-price tips, expect to get cut-quality tips. It is basic that you never get more than you pay for.

You EXPECT more from TIPALOY and you GET more! TIPALOY electrodes cost more, but for a slightly higher initial cost these are your major gains:

1. 30% to 100% longer electrode life!
2. Less down-time and maintenance!
3. More welds per electrode!

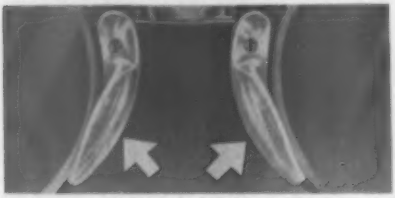
Write for the story of Tipaloy today! Distributor franchises available!

Tipaloy INC 1435 EAST MILWAUKEE DETROIT 11, MICHIGAN

Circle No. 53 on Reader Service Card.

Plastic Goggle Pads

A new bridge pad for its line of "Cesco" goggles is announced by Chicago Eye Shield Co. Made of plastic, new



pads, are said to mold themselves to the individual wearer's nose structure and thus give added comfort.

Circle No. 11 on Reader Service Card.

Underwater Electrodes

Two electrodes for underwater cutting and welding have been introduced by Pacific Welding Alloys. Both are claimed to be extremely simple to use. The "UC" can be employed on land for cutting difficult materials such as cast iron, stainless steel and other alloys. "UW", the welding electrode, is said to give underwater service with a minimum of clouding.

Circle No. 129 on Reader Service Card.

Electrode Holder

An electrode holder said to offer 100% conductivity features a body of pure copper. According to the manufacturer, the unit, called "Mono-Hole" provides cool operation even at high current ranges. Insulation nose is slotted for easy entrance of electrode. With capacity up to ¼" electrodes, the holder is claimed to be particularly adapted for use with heavy coated, hard starting rods.

Circle No. 42 on Reader Service Card.

Contact Electrode

A new contact type electrode for welding carbon steel is said to feature automatic slag removal and rapid deposition. According to Eutectic Welding Alloys Corp., "Eutec-HandOmatic No. 2" offers 100 percent slag coverage without slag inclusion on all types of beads.

Circle No. 59 on Reader Service Card.

Soldering Flux

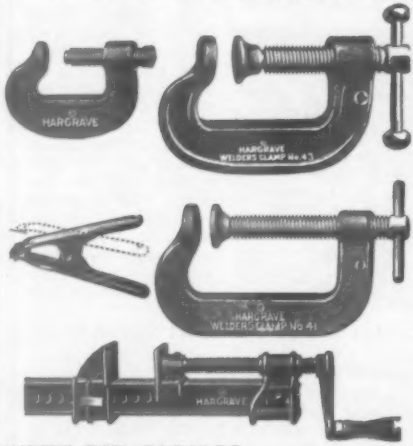
Aluminum and a wide variety of other metals can be soldered with a new liquid flux being marketed by Belmont Smelting & Refining Works, Inc. According to the manufacturer, the flux is neutral, non-corrosive, and the fumes, non-toxic. Three types are available for low, medium and high temperature soldering.

Circle No. 130 on Reader Service Card.

HARGRAVE Tested Tools
THE CINCINNATI TOOL COMPANY

WELDERS' CLAMPS

THE MOST COMPLETE LINE
Individually Power-Tested for Better Performance



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Showing a Clamp for Every Purpose, openings from ¾" to 12' and depths from ½" to 16", also Chisels, Punches, Masonry Drills, Brace Wrenches, Washer Cutters, File Cleaners, etc.

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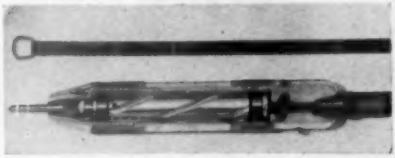
1985 Waverly Avenue • Cincinnati 12, Ohio

There is an Industrial Distributor stock near you

Circle No. 70 on Reader Service Card.

Handy Portable Grinder

A pencil-type air grinder for small weld finishing operations is announced by Jett Products Corp. The "Pencil Grinder" is said to be easily controllable and practically free from vibration because of its rotor design. Another feature is the use of spent air to blow away chips and debris from the cutting tool point.



Circle No. 131 on Reader Service Card.

Control for Automatic Welding

An automatic control developed by Glenn Co. is said to regulate power, rod feed, gas and water in automatic spot and tack welding operation where a constant potential power source is used. Easily installed and compact, the unit is claimed to operate inexpensively.

Circle No. 132 on Reader Service Card.

Welder's Special!

GRIPSO triggermatic

VISE PLIERS

COPPERPLATED FOR PROTECTION

Just as your mask and gloves protect *you*, so the copperplating protects this most valuable tool from welding spatter and from being welded to the work. The finest tool of its kind in the business. Adjusts, locks, releases, all with one hand. Clamp, hand vise, pliers, pipe and nut wrench, all in one. Holds parts securely for welding, cutting, grinding. An item every welding Jobber will want to stock. Get the whole Gripso story today. Write H. R. Basford Co., Dept. W, 235 15th St., San Francisco 3, Calif. (Warehouses Chicago, Ambler, Pa., New York City.)

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Crobalite

cobalt-chromium-tungsten

HARD-FACING ALLOYS

Easy to apply

by arc or torch. Flow on extra-readily in a uniform, slag-free layer.

Give Superior Resistance

to abrasion, corrosion, oxidation and impact—with high hardness—even at red heat.

Three Proven Grades

meet every requirement of production and maintenance, in every field.

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NOW!

LOW COST WELDING AUTOMATION

WITH **SAM***

***S**emi-**A**utomatic
Manipulator

See you at
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Welding Show,
June 8-10

Mount your semi-automatic control cabinet on SAM . . . convert the head into a speedy self-propelled tool!

—arc height: floor level to 8 ft.
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—any speed from 0 to 120 in. per minute . . . infinitely variable
—boom runs smooth and true
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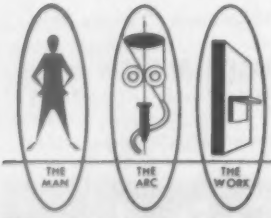
—portable—move across shop in a hurry

AVAILABLE FOR IMMEDIATE DELIVERY!



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pandjiris weldment co.

DESIGNERS AND MANUFACTURERS OF PRODUCTION WELDING EQUIPMENT
5151 NORTHRUP AVE., ST. LOUIS 10, MO., U. S. A.

efficient positioning of all three

THE WORLD'S LARGEST MANUFACTURER OF "AUTO-WELD-MATONS"®

Circle No. 57 on Reader Service Card.

Welded sleeves used for jet plane duct ends and strip stock from which they are made are held by Northrop engineer Edwin A. DeVoss, who originated the idea. Also shown is seamless tubing and resulting waste when tedious and expensive machining methods were required.

HOW INERT-ARC WELDING SAVED NORTHROP A MILLION DOLLARS

A SIMPLE, yet ingenious, use for inert arc welding equipment enabled Northrop Aircraft, Inc., to save a million dollars in the manufacture of a single part for Scorpion all-weather interceptors for the U. S. Air Force.

It involved the welding of Types 321 and 347 stainless steel rings varying from 1" to 5¼" in diameter, which were suitable for use in forming ends for hot air ducts with cam-action dies in a punch press.

Eliminate Tedious Machining

Prior to use of welding, the accepted method of making these rings consisted of machining heavy-walled tube stock because extremely close dimensional tolerances had to be maintained. Aside from the fact that this was a tedious procedure, the machining technique represented quite a problem for Northrop's purchasing department because it wasn't always possible to buy tubing with specified wall thicknesses and diameters.

Welding equipment might have been specified for the fabrication of suitable tube sections from the start, except for the fact that it was considered impossible to main-

tain 0.010" diameter and 0.005" concentricity tolerances on the flanged duct ends if the latter had longitudinal weld joints.

Couldn't Use Punch Press

Punch press equipment couldn't be used to form seamless stainless steel tubing, because of the unusual dimensions and configurations of the duct ends.

A typical duct end with a 5.250" diameter, machined from seamless tubing with a 0.375" wall thickness over a period of three hours, resulted in production of about two pounds of stainless scrap.

Thanks to the welding innovation, strip stock is now used in place of seamless tubing. It is rolled into a sleeve and welded on a steel mandrel in each instance.

Hot air duct ends were once made by machining seamless tube stock. As indicated below, the fabrication of each part produced two pounds of stainless steel scrap. Compare the dimensions of the scrap in this picture with the size of strip, welded sleeve and final formed part in lower right section.

Copper Insert Prevents Fusion

A copper insert prevents fusion of the weld on the mandrel, and an unusual clamp enables the welded ring section to retain precise dimensions of the mandrel by holding the strip completely around its periphery—that is, of course, with the exception of the weld area—as welding takes place.

A little build-up at each end of the weld on each sleeve prevents undercutting.

Following the welding operation, the mandrel and sleeve are removed from the clamp and placed on a pin so that the sleeve can be turned on a contact sanding belt which removes excess materials until the weld surfaces are flush.

Size to Close Tolerances

Sizing of the welded sleeves is such that each has a plus 0.005", minus 0.003" diameter tolerance at the time it is removed from a mandrel.

Prior to the development of the punch press dies, which are now being used to form the sleeves, Northrop conducted a series of tests with the welded strip components. It was found that by providing a punch with an 0.090" radius for the sleeve to form against, a flange was easily formed. However, when it was unrestricted,

TUNGSTEN ELECTRODES MAY *LOOK* ALIKE

But Have You Tried THESE NEW ONES by ELMET

Even if you judge tungsten electrodes by *appearance* alone, you'll like the new ELMET Efficiency Electrodes.

When you judge by *performance*, you'll find that ELMET Electrodes stand in a class by themselves. Their uniformity of properties, dimensions and characteristics prevent loss of time due to readjustments of equipment and voltage.

Furnished in cleaned finish and centerless ground finish. Available in packages of 10 in all standard diameters from .040" to ¼" and from 3" to 18" in length. North American Philips Company, Inc., Elmet Division, Lewiston, Maine.

Try New ELMET Electrodes Now! Use Coupon Below

Don't delay! Do it today! Send the coupon and get the facts about ELMET Efficiency Electrodes.

Distributor Inquiries Invited

Free Folder

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Box 1041D, Lewiston, Maine.
Please send me ☐ Free Folder and

☐ *Price on* _____ *Elmet Electrodes.*
(quantity, size, finish)

Name_____

Street_____

City_____ State_____

☐ *Send me your distributor proposal.*

Circle No. 56 on Reader Service Card.

the flange continued in an arc and formed a grommet.

Therefore, punches for sleeves with different wall thicknesses are now dimensioned so as to maintain a minimum cavity between the punch and the die—and, thus, to obtain a flat flange and avoid wrinkling the sleeve—in each circumstance.

Use Strip Stock

A single width of strip stock is used in welding all sleeves in order to reduce material costs and to save much of the time that would be required to shear sheet stock. Slitting rolls are used to cut the strip stock to specified width dimensions.

The total amount of time required to weld and form each sleeve amounts to less than five minutes per part.

Resultant savings have been exceptionally high, as previously noted, because Northrop uses up to 150 duct ends on each interceptor.

Olsen to Handle Rotor

The Olsen Co., Los Angeles, Cal., has been selected as West Coast dealer for Rotor Tool Co.'s line of portable air and high cycle tools and repair parts.

"FLUX-WELL"

Welding Fluxes

No. 1—WELDING FLUX
For Cast or Malleable Iron

No. 2—BRAZING COMPOUND
For Brass, Bronze, Steel Brazing

No. 4—ALUMINUM FLUX
For Cast or Sheet Aluminum

No. 5—BRAZING COMPOUND
For Cast or Malleable Iron

Write for Free Folder!

Weld Rod Division

THE CHICAGO HARDWARE FOUNDRY CO.

NORTH CHICAGO, ILL.

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Amco Fluxes . . . .

FIT YOUR JOB

Assure Welding & Brazing Success

. . . EVERY TIME

You are always sure of complete oxide removal and deep penetration when you use the proper Amco flux. Why? Because Amco chemical research and development make Amco fluxes right for the particular job. Whether you're working with ordinary metals, stainless steel, aluminum, cast iron or steel . . . there's an Amco flux to assure perfect bonding.

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Flux Manufacturers Since 1910
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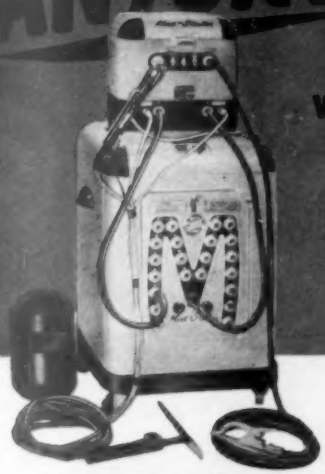
ANYONE CAN DO A BETTER JOB WITH Mid-States HEAVY-DUTY WELDERS



Mid-States Model 310, 7-300 amps. with Model 13-D "Missing Link"

Even operators with a minimum of experience can do a real workmanlike job with Mid-States Simplified Welding. Mid-States welders provide automatic arc starting, instant amperage changes, and 100% penetration. Virtually adjust themselves to the job! Instant starting speeds up production and eliminates burn-through when welding light metals. 100% penetration assures a stronger, smoother weld that requires only a minimum of cleaning and grinding.

There are no moving parts to wear out, adjust, and maintain—a Mid-States Welder will continue to provide top performance year after year with only a minimum of attention. In addition, the Mid-States Welder can be used for brazing, soldering, hard-surfacing and heating.

NOW YOUR PRESENT WELDER CAN DO INERT GAS SHIELDED WELDING . . .

JUST ADD THE MID-STATES "MISSING LINK" AUTOMATIC ARC STABILIZER . . .

Add the Model 13-D "Missing Link" and you've got the benefits of inert gas shielded arc welding at sensationally low-cost. Model 13-D is easily attached to any AC welder of 0-300 amps. For AC welders 300-600 amps., and DC welders, other models are available. This compact unit includes a high frequency generating circuit and solenoid valves to control flow of inert gas and water. The entire unit is controlled through a finger tip switch mounted on the welding torch.

Model 13-D "Missing Link"

WRITE TODAY for complete information on Heavy Duty Mid-States Welder and the Model 13-D "Missing Link" for inert gas shielded welding.

Mid-States WELDER MFG. CO.

6025 SOUTH ASHLAND AVENUE • CHICAGO 36, ILLINOIS

Circle No. 200 on Reader Service Card.

Circle No. 60 on Reader Service Card.

Circle No. 63 on Reader Service Card.

NEW BOOKS REVIEWED

Resistance Welding of Copper and Copper Alloys

A new bulletin in their series on various phases and applications of resistance welding has just been released by the Resistance Welder Manufacturers' Association. Designated as Bulletin 20, it covers resistance welding of copper and copper base alloys.

Consideration is given in the bulletin to various factors entering into the weldability of these metals, as well as technical aspects of the welding processes recommended.

The nine page bulletin contains a number of helpful tables and illustrations. Copies are available from Resistance Welder Manufacturers' Association, 1900 Arch St., Philadelphia, Pa.

Home Welding Handbook

Up to recently the growing do-it-yourself movement has been limited to woodworking and non-metalworking processes. However, since the introduction of a number of home workshop welders and simplified techniques for the beginner, a place has existed for a simple set of instructions for making metal articles for home and farm. Such a place is now filled by a little pamphlet issued by the James F. Lincoln Arc Welding Foundation. A reprint from a larger work, "Farm Arc Welding," the brochure contains plans and instructions for farm and home application. Photos and plans make the projects simple, yet interesting. Available from the foundation for fifty cents.

British Electrode Survey

A manual detailing properties of all electrodes now available in Great Britain has just been published. This is the first such comprehensive survey of British electrodes. Divided into five parts, the book breaks down electrodes by manufacturer and provides necessary identification and operating data. British Standard Classification numbers are given.

Each section of the book deals with a different type of electrode. Covered are mild steel, alloy steel, cast iron, hard facing and non-ferrous electrodes.

This summary is the first of a planned "Directory of Welding and Fabricating Equipment" to be published by the Louis Cassier Co., Ltd., publishers of the English trade journal, "Welding and Metal Fabrication."

Quality Control Of Stainless Steel

Fabricators of stainless steel whose welds must meet high quality control standards will be interested in a newly published monograph by Helmet Thielsch, Metallurgical Engineer, Grinnell Co. Mr. Thielsch details procedure used in conducting a dozen different types of tests for determining strength, corrosion resistance and metallurgical qualities of stainless steel welds. He surveys such methods as fluorescent and dye penetrant inspection, radiographic, magnetic-particle, ultra-sonic and visual testing. In addition, he lists 150 sources of published and unpublished information relating to the subject. A valuable addition to

AUTOMATIC TORCHES

THE HEART OF ECONOMY

Approved by Underwriters' Laboratories

BY ACTUAL COMPARISON

USING NON-AUTOMATIC TORCH . . . . . 12 Pieces Welded
USING NON-AUTOMATIC WITH GAS SAVER . . 18 Pieces Welded
USING HARRIS AUTOMATIC TORCH . . . . 28 Pieces Welded

Using the same amount of Oxygen and Acetylene for each set-up, this "Actual Comparison" Demonstration proved the Harris Automatic Torch to be a profitable investment for economical and efficient welding work.

Let our local Distributor show you the "Actual Comparison" test in your plant and explain quickly and simply why the Harris Automatic has the greater piece production at the lowest cost.

ALMOST 50 YEARS OF "KNOW-HOW"

Harris is the originator of the "Automatic" Torch and with almost 50 years of building "Know-How" behind every torch, the buyers and users get tremendous returns on their torch investment.

Harris' long established Distributors, located in all principal cities in the United States and Foreign Countries, are at your service.

HOME OF AMERICA'S FIRST AND FINEST GAS WELDING AND CUTTING APPARATUS.

THE HARRIS CALORIFIC COMPANY
Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

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the technical library. Copies may be purchased through the American Welding Society, 33 W. 39 St., New York 18, N.Y., at $1.00 each.

New Specs For Nickel, Nickel Alloy Coated Rods

Here, for the first time, are standard requirements for nickel and nickel base alloy covered welding electrodes. These new specifications, issued jointly by AWS and ASTM, cover electrodes for welding these materials to themselves and to nickel base alloy clad steels.

A table gives the chemical analysis of the different classifications. Sizes and lengths, packaging requirements and tests for verifying conformity of a given filler metal to the standards set are provided. An appendix aids readers to select the most suitable filler metal for their needs.

Copies of specifications can be obtained for twenty-five cents from the American Welding Society, 33 W. 39 St., New York, N. Y.

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BECKER
CARBON
WELDER BRUSHES
for all types and makes of welding equipment

Everything you need from *one* source, with *one* responsibility. The fast, economical way to order. Catalog gives complete specifications, factory numbers, scaled drawings, etc. Write for your free copy today.

WHOLESALERS:
Some Distributorships still open. Write for information.

BECKER BROTHERS CARBON CO.
3450 SO. LARAMIE AVE. • CICERO 50, ILL.
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Expanding Frontiers

"Welding for Engineers" examines both the theory and practice of welding from the point of view of extending the frontiers of the process. Beginning with a study of cold, hot pressure and resistance welding, the book proceeds to deal with permanent and consumable electrode methods, as well as welding with chemical heat sources. Extensive coverage is devoted to brazing, braze welding, testing and weld inspection.

The work is written by Drs. Udin and Wulff of the Department of Metallurgy, Massachusetts Institute of Technology. A third participant is Dr. E. R. Funk, engineering consultant with Goodyear Aircraft Corp.

Priced at $7.50, the book is published by John Wiley & Sons.

1954 Brad-Vern Report Out

Brad-Vern's Reports has announced appearance of their 1954 annual summary of business paper advertising which gives the where-when-and-who of commercial and industrial advertising.

Ohio State Adds Two

The Welding Engineering Department at Ohio State University has announced the addition to its staff of Dr. Robert McMaster. Formerly at Batelle Memorial Institute, Dr. McMaster's specialties are resistance welding and nondestructive testing.

Simultaneously, the school announced the return of William L. Green as instructor in the department after a two year tour of duty with the U. S. Navy.

Portable Sandblast Gun

COMPLETE—simply connect to air line

- RUGGED
- EFFICIENT
- GUARANTEED

$27.50

A Real Performer • Handy in any shop

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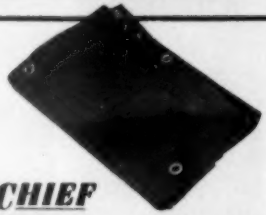
REEVES



FIRE-CHIEF

Treated Welding Curtains

CONFINE YOUR DANGER

A close woven canvas, weighing 10 ounces per square yard before treatment, impregnated with Hooper's Fire Chief treatment under their patent which carries the Underwriters Laboratory seal.

"IF IT'S MADE OF CANVAS, WE MAKE IT"

A. SMITH & SON, INC.

GREEN & RIDGE AVE. • PHILADELPHIA 23, PA.

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NEWS of the WELDING INDUSTRY

Alloy Rods Fills New Posts

E. R. Walsh, formerly General Sales Manager, has been named to the newly created post of Vice President in charge of all sales and marketing for Alloy Rods Co. This was announced by E. J. Brady, President of the York, Pa. firm.

A companion post, that of vice president in charge of production,

Hohman

Walsh

went to George M. Hohman. With headquarters in New York, Hohman will head up operations at both the Pacific Coast and Pennsylvania plants.

Kotula Co. Selected By Fibre-Metal Products

Charles Bowers, president of Fibre-Metal Products Co., has announced the appointment of Kotula Co. to handle advertising and public relations for his firm. Fibre-Metal manufactures a full line of welding accessories and industrial safety equipment.

AWS Welding Show Set For Kansas City

With an eye to the expansion of industry in the South and Southwest, the American Welding Society has selected Kansas City for its Third Annual Welding Show. This will be the first heavy industry exposition to be staged there.

Set for June 8 through 10, the show will run concurrently with the AWS Spring Technical Meeting also scheduled for that city. According to J. C. Magrath, national AWS secretary, space taken for the June show already exceeds that of the society's last exposition held in Buffalo.

Day Announces Start of Delta Welder Corp.

Formation of Delta Welder Corp. has been announced by Harry E. Day, President. Formerly Vice President of Link Welder Corp., Day outlined plans for the production of fully automatic multiple point resistance welding machines. With Day will be Glenn Cashdollar, formerly executive vice president of Link Welder Corp.

It's a cuttin' fool!

Light heavy-weight cutting torch *It's a* ***TRIPLE THREAT***

NEW Smith's Cutting Torch

Does the work of a heavy-duty torch but is LIGHT and easy to handle

Cuts anything from tomato cans to 14" steel (using proper tips). Yet it is light-weight and perfectly balanced. A brute for performance but easy on the operator. We put into this torch what you and other operators asked for.

Slip-In-Tips—no wrenches needed.

Just slip the tip in, spin the nut with your fingers and you're ready to go. How could anything be easier? Try it yourself and see.

3 inter-changeable controls—quick change from one to the other in less than 1 minute

1. Over lever.

2. Trigger.

3. Under Lever as shown at right

No matter what type of cutting jet control you prefer, you have it in this torch—and you can switch from one to the other any time you want. Adaptable to any personal likes or techniques. Reduces number of torches needed to accommodate all operators' requirements.

No slag . . . cuts clean.

The new Smith Tips with this torch give you clean, knife-line cuts with narrow kerf and almost complete absence of slag. Operator does not have to waste time cleaning up his cuts. Speeds up production. Want a demonstration?

This new torch ingeniously combines more operating advantages than any you have ever seen. Trade tests to date have been sensational.

Write for details

SMITH WELDING EQUIPMENT CORP.

Dept. I.W. 163 2633 S. E. 4th St. Minneapolis, Minn.

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Circle No. 67 on Reader Service Card.

WHEN YOU BURN OFF GALVANIZING

RE-GALVANIZE with Galvalloy

WILL
- BOND QUICKLY
- BOND PERMANENTLY
- BOND TO MOST METALS
- WITHSTAND 30 DAY SALT TEST

NO
- FLUX
- SANDBLASTING
- CLEANING

WON'T
- PEEL OFF
- BURN OFF
- CHIP OFF

Applying Galvalloy

Pre-Heating

METALLOY PRODUCTS CO.
1351 EAST 17TH ST., LOS ANGELES 21

AWS Papers Highlight Western Metal Congress

Technical papers on welded fabrication of aluminum and titanium, resistance welding and brazing and tooling for automatic welding will highlight American Welding Society sessions which are a feature part of the Ninth Western Metal Congress, March 28 through April 1. The Congress will be held in Los Angeles Ambassador Hotel simultaneously with the Ninth Western Metal Exposition which will feature displays of welding equipment and production set-ups in Pan-Pacific Auditorium.

RWMA Fills Posts

J. C. Wilson, president of Acro Welder Mfg. Co., has been elected President of the Resistance Welder Manufacturer's Association. Vice-presidency went to D. V. Uihlein of Banner Mfg. Co., and chairmanship of the organization's important technical committee went to J. F. Deffenbaugh of Federal Machine and Welder Co.

ANOTHER FIRST BY CARLSON!

A WELDER'S RULE with LENGTH TO SPARE!

CARLSON Super Chief 16 FEET LONG

⅜" WIDE WHITE BLADE

Here's a long, long, wide white blade in a compact pocket-size package, designed with the welder in mind. 6-feet longer than any rule now available, the Carlson Super Chief is extra long for extra convenience in one-man measuring. With the new, functional Super Chief, one-man measuring is easier, by far

It's a Welder's rule—with length to spare. Order yours from your hardware dealer or supplier.

Less Apt to Burn: Handy re-wind crank moves the 16-ft. blade smoothly in or out of case—without backlash—to protect blade from torches.
Quick Blade Change: Change to new blade in 10 seconds—without opening the case.
Easy-to-Read: Jet black numerals on new, wider snow-white blade won't surface crack or peel.
Converts Feet to Inches at a Glance: Double graduations show both feet and inches on full length of blade.
Patented Swing-Tip: For easier, quicker inside and butt-end measurements.

CARLSON & SULLIVAN, INC.
MONROVIA, CALIFORNIA

Produced under Patents 2089209, 2510939, 2629180 & Pat Pend.

Circle No. 69 on Reader Service Card.

Three welding program leaders go over schedules. Shown is Hugo W. Heimke, program chairman, (center), Harlan L. Meredith of North American Aviation, Inc. (left) and Richard C. Hayes of Douglas Aircraft Co. (right). Mr. Heimke is president of California Alloy Products Co.

Welding Takes TV Spotlite

In one of the first programs of its kind, members of the Cleveland American Welding Society chapter presented a half hour TV show. Charles Herbruck, Ross Yarrow, Wasil Romance and William Mumford, members of the Cleveland Chapter told a high school senior about the various types of welding and career possibilities in the industry.

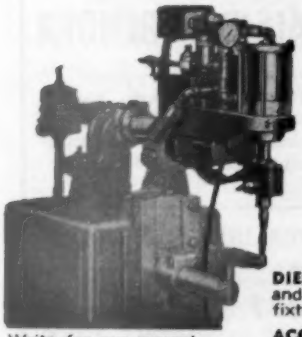
New Type Grinding Wheel Announced

In the February issue of Industry and Welding, Colonial Abrasive Products Co.'s unusual new "Grind-away" wheels were inaccurately described. These wheels contain inner reinforcement rings which have a tensile strength higher than that of steel. The text of the item erroneously claimed that the rings do not abrade away with use. Actually, one of the most important features of this new wheel is the fact that the rings do abrade away. This is all important in the service life and safety of the wheel.

The article also labelled the wheels "explosion proof." Tests run at speeds 20% above normal indicate these reinforced wheels do not explode. However, no manufacturer can definitely guarantee that wheels will not explode under abnormal conditions or dangerously high speeds.

For more data on these wheels circle number 64 on Readers' Service Card.

Turn to Page 26 for easy index to products advertised in this issue.



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Solve Your Welding Problems
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Spot, Butt, Seam, Gun, Flash, Projection, Multi-Point and Stud Welders

NEW • USED • REBUILT

← WELD-AIR-MATIC
Spot welder air conversion unit. Tests prove 10,000 welds hourly on continuous daily schedules.

BUTT-ON-SPOT →
Automatic butt welding attachment. Water - cooled, fits any spot welder with minimum horn clearance of 7".

DIES: complete facilities to design and build special welding dies and fixtures for your piece parts.

ACCESSORIES: complete stock of Welder Controls, Holders, Tips, and Bar Stock.

ROBT. W. HOFFMAN CO., INC. 38 South Clinton Street, Chicago 6, Illinois

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LOW TEMPERATURE AND SPECIAL ALLOYS

WEMCO

RODS AND ELECTRODES

FOR GAS AND ARC WELDING AND BRAZING

CAST IRON WELDING

All types for gas or arc, machinable, good color match, easy to handle, low cost.

BRAZING ALLOYS

All types, including phosphor-copper, silver alloys, aluminum and magnesium, for gas or arc.

STAINLESS STEEL

Coated electrodes for AC or DC. Shipped in convenient 5 pound packages.

SILVER SOLDERS

All types for all purposes. Fast-flowing, low-melting alloys for torch or furnace applications.

ALL WEMCO PRODUCTS ARE "JOB-TESTED" FOR QUALITY RESULTS

Write for Valuable Free Application and Procedure Data

WELDING MATERIALS MFG. CO.

PRATT ST. WHALOM • FITCHBURG, MASS.

Eisler Has New President

Charles Eisler, Jr. has been selected President of Eisler Engineering Co., Inc. He replaces his father, Charles Eisler, who remains with the firm as Chairman of the Board. The firm manufactures resistance welders and positioners for welding and brazing.

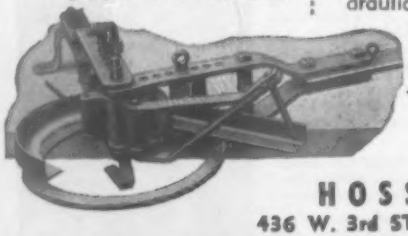
Changes at Eutectic

Joseph F. Quaas, formerly manager of Eutectic Welding Alloys Corp. electrode production division, has been elevated to the position of Director of Manufacturing and Production. Quaas will be aided by John Broderick, who has been named supervisor of practical welding research.

Two other employees, Richard Hillistad, district engineer for Western Iowa, and Aaron Rupp, District Engineer for Northern Michigan, marked ten years of service with the company.

HOSSFELD No. 2 UNIVERSAL® IRON BENDER

ONE MAN . . . ONE BENDER



Bends rounds, pipe, flats, conduit, squares, tubing, angle iron flange in or out. Hydraulic Attachment (optional) available for those tough, hard-to-pull bends on heavier material . . . fits any Hossfeld No. 2 Bender.

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HOSSFELD MFG. CO.

436 W. 3rd STREET • WINONA, MINN.

Circle No. 73 on Reader Service Card.

EMPLOYMENT OPPORTUNITIES

SALES MANAGER — Arc Welding Accessories. National Distribution. Top earnings. Extensive travel. Submit resume. Box 3552. Industry and Welding.

SERVICES AVAILABLE

Welding supervisor, inspector, expeditor. Valuable experience working closely with engineers, consultants and management on special welding problems. Young, ambitious, confident. Can relocate. Box 3553. Industry and Welding.

SALESMEN

Top welding supply distributor needs two salesmen in Northern New Jersey. Handle Arcair, All State, Linde, Oxweld, Prestolite, Westinghouse products. Good salary, car allowance, commission. Box 3551, Industry and Welding.

Dealer Services Widened At Hudson Welding

A wide range of services for the customer have been announced by Hudson Welding Supply Co., Hoboken, N. J. Included among the services planned are free welding clinics, evening courses and plant demonstrations. Hudson is a Metal and Thermit distributor and has facilities for repair of gas welding equipment.

For Valuable Reference Material Available at no Charge— See Page 8.

Circle No. 76 on Reader Service Card.

MEETS EVERY STANDARD ACROSS THE WORLD!

The leader for over forty years.
Quality in any quantity.

SHAWINIGAN
PRODUCTS CORPORATION
EMPIRE STATE BLDG. ● NEW YORK 1, N.Y.

#601

ALJAY'S SAF-T WELDER'S CLOTHING

Leather cape sleeves with detachable bib. Made of fine chrome leather to resist hard wear and heat.

- Soft and Pliable
- Full Cut
- Adjustable Snaps
- High Quality

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Aljay Manufacturing Co., Inc.
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Circle No. 78 on Reader Service Card.

Up to 150% longer electrode life with AMPCO WELD* seam-welding wheels

Cut downtime and end costly production losses with Ampco Weld wheels.

Ampco Weld hardness and toughness at elevated temperatures provide unusual wear resistance. Many users report up to 150% longer life with Ampco Weld seam-welding wheels.

All wheels meet or exceed RWMA specifications. Ampco Metal, Inc. gladly furnishes engineering service for specialized applications. Order Ampco Weld wheels now — and get tough with costs.

*Reg. U. S. Pat. Off., Ampco Metal, Inc.

RW-4A

AMPCO METAL, INC.
MILWAUKEE 46, WISCONSIN
West Coast Plant: Burbank, California
It's production-wise to Ampco-ize!

SILVER BRAZING . . .

(Continued from Page 54)

ductors made from copper tubing. Ranging in wall thickness from $\frac{3}{16}$ to $\frac{7}{16}$-inch, tubing varies in outside diameter from 2-inches to 10⅝-inches. Copper castings, which range in weight from 20 to 200 lbs., are made to give smooth contours for good electrical design.

Castings and tubings are machined to .002 inch clearance to insure good brazing, assembled in special fixture and checked for overall dimensions. Parts are fluxed and $\frac{1}{16}$-inch diameter brazing wire placed in machined grooves on castings. A neutral to slightly oxidizing flame is used to heat brazing alloy which flows at 1170° F.

Work is done on protractor-type fixture which makes it possible to join tees or elbows to tubing at exact angles ranging up to 180°.

Other Brazing Applications

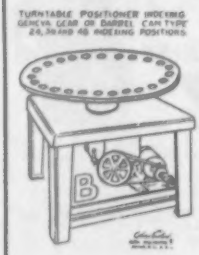
Brazing also plays an important part in joining brass nuts and fine silver contacts to the electrical conductors. These copper tubing sections are bolted together by as many as 24 bolts, depending upon the size of tubing.

Indexing Turntables, Positioners For Brazing And Welding

Spot Welding Tips Made To Your Specifications. All Types And Sizes

Spot Welders Press Foot Or Air Operated

Wire Butt Welders For Various Alloys And Saw Blade Welders



CHAS. EISLER, Jr., Pres.

EISLER ENGINEERING CO., INC.

735 So. 13th St.
Newark 3, N. J.

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Using a special fixture and radiant burners for heat, brass nuts are brazed to the inside of the copper tubing at the same time as a washer-type fine filter contact is brazed to the outside of the tubing.

By varying the number of radiant burners — three or more — as many as 24 brass nuts and 24 silver contacts—a total of 48 brazes—can be made in less than five minutes.

Nuts and preplaced brazing alloys are held in position at holes on inside and silver contact at holes on outside of tubing by special fixtures. These fixtures are made of graphitic iron to prevent brazing of the silver contact to the fixture.

Parts are first preheated to 1000°. Tubing is then gradually withdrawn from fixture. Flame passes over joints causing brazing alloys on inside and outside of tubing to flow. Alloy on inside flows at 1270° F, while that on underside of silver contact flows at 1435° F. By allowing for variation in volume and thickness of parts and distance from flame, both alloys are made to flow at approximately the same time.

TIME LO$T

CUTTING AWAY *Profit* DOLLARS ON PIPE FABRICATION?

If tedious hand-cutting and fitting is chewing into your pipe fabrication profits, put a stop to it right now! The new light-weight H & M Shape Cutter whips your most difficult contour cutting problems in minutes. Simply attach correct pattern to your H & M Cutter and Beveler; lift the split horseshoe-shaped gear over the pipe; snap the spring-tension chain fastener locking the H & M in place; light torch — adjust flame — turn the crank — THAT'S ALL! For more detailed information . . . . write for FREE folder: "MORE PROFIT DOLLARS . . ."

H&M PIPE BEVELING MACHINE CO.

311 E. 3rd St., Ph. 3-0241, TULSA, OKLA.

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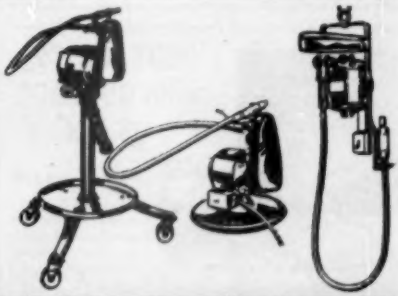

where there's a weld

HERE'S *the* WAY...

to smooth flawless seams and well-blended welds . . . and that's with Haskins Flexible Shaft Equipment. A light, high-speed handpiece, backed by controlled and sustained heavy duty power, makes smooth work of even the roughest weld quickly and inexpensively. That's why welders all over the nation rely on Haskins . . . manufacturers of flexible shaft equipment and attachments for every grinding, sanding, polishing and buffing need.

For additional information write:

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FLEXIBLE SHAFT EQUIPMENT

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TOUGHIDE
Arc Welding Cable

EXTRA FLEXIBLE
HIGHEST QUALITY
LOWEST PRICES

#2	$215	#2/0	$388
#1	$256	#3/0	$484
#1/0	$323	#4/0	$603

Cable packed in 250-ft. coils.
Two or more coils shipped prepaid.
Dealer Inquiries Solicited
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STAHL EQUIPMENT CO.
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CUT COSTS
with BULL DOG
Grip-Lug

SPECIAL SHAPE
Tractor Grouser Retreads for faster, safer, better, lower cost welding

- Lower maintenance costs
- Increase tractor efficiency
- Save expensive down-time.

Selected dealer territories available.
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Non-Toxic,
Smokeless Welding Fluid

NO SPAT eliminates slow, costly grinding, chipping, cleaning of weldments, keeps welding jigs spatter-free. Suppresses fumes; no carbon monoxide. Prevents rust, conditions metal surfaces for painting. Ready to use. Test NO SPAT now! Write for FREE sample.

THE MIDLAND PAINT & VARNISH CO.
3804 EAST 91st ST. • CLEVELAND 5, OHIO

Circle No. 84 on Reader Service Card.

Hobart Picks Roediger

Robert E. Roediger has been appointed sales and service representative for Hobart Bros. Co. in the Birmingham, Alabama area. Roediger will have headquarters at 2657 Park Lane Court East, Birmingham, and will operate as Hobart Welding Supply Co.

Lincoln Foundation Sets $12,000 Awards Program

A $12,000 awards program for papers describing the use of arc welding in machine tool design has been announced by the J. F. Lincoln Arc Welding Foundation. Fifteen awards will be given. Program closes July 15, 1955.

Lukens Gets T-1 License

Lukens Steel Co. has been granted the first license by U. S. Steel Corp. to produce the new T-1 steel. Lukens' facilities permit production of a wide assortment of plate sizes and special items.

American Brass Plans Second Aluminum Plant

American Brass Co., a subsidiary of Anaconda Copper Mining Co., has announced plans for the construction of an integrated aluminum mill on the outskirts of Terre Haute, Indiana. As projected, the mill will eventually employ 1000 workers, and will turn out ingots, billets, sheet, strip, tubes, rods and special shapes.

Anaconda's previously announced reduction plant at Columbia Falls, Montana is scheduled for completion about the middle of this year.

Newport Opens New Cold Roll Mill

A new reversing cold mill has been added to Newport Steel Corp. facilities as part of a $9,000,000 expansion program. Since March 1954, Newport has been a subsidiary of Merritt-Chapman & Scott Corp., headed by Louis E. Wolfson. The new mill is one of the few in the U.S. where strip is hot rolled directly from ingot to finished coil in one straight line operation.

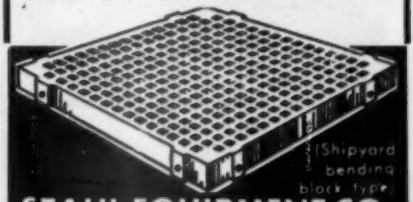
Armour Foundation Adds Research Library

A complete collection of welding books and articles has been contributed to the Armour Research Foundation by the James F. Lincoln Welding Foundation. According to Orville T. Barnett, supervisor of ARF research, the collection will be an invaluable tool in furthering the foundation's work. It will be kept up to date through addition of current published material.

Circle No. 71 on Reader Service Card.

WELDING and SET-UP PLATENS

Floor plates — bending tables — layout tables—straightening tables—dog blocks bending blocks—blacksmith blocks. 5'x5' 6'x6' — 6'x8' — 6'x10' — 5'x10' 6'x12'—3'x3'—either 6" or 7" thick.



(Shipyard bending block type)

STAHL EQUIPMENT CO.

94 Washington St.
Brookline Village 46, Mass.

PROLONG PRODUCTIVE LIFE of WORN SHOVEL and DIPPER TEETH

MANGANAL

T. M. Reg. U. S. Pat. Off.

11% - 13½% Manganese-Nickel Steel

WEDGE BARS

We'll be happy to tell you how to save money by repointing worn teeth with Manganal Wedge Bars. Write today!

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SOLE PRODUCERS

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FOR BETTER METAL MARKING

WELDERS AND METAL WORKERS SOAPSTONE • TALC CRAYONS • CLOVER BRAND — 3 GRADES

Send for descriptive folder and prices

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260 West Broadway
New York 13, N. Y.

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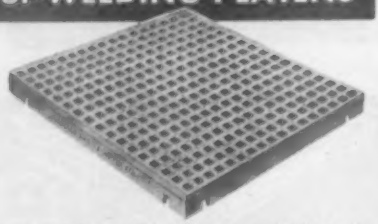
BENDING BLOCKS
or WELDING PLATENS



5 ft. by 5 ft. by 5½ in. cast steel blocks for layout, welding and assembly. Write today for information. Other sizes. Tools, stands & accessories.

ACORN IRON & SUPPLY CO.
Delaware Ave. & Poplar St., Philadelphia 23, Pa.

Frees Both Hands
For the Job!

No. 9, 9"
ONLY $2.95

VISE-GRIP
WELDING
CLAMP

LOCKS WORK IN PERFECT ALIGNMENT

Companion to the Famous
VISE-GRIP Wrench

No. 10W
$2.60

Made Only by Petersen Mfg. Co., Dept. IW-3, DeWitt, Nebr

Circle No. 89 on Reader Service Card.

NO JOB TOO TOUGH FOR - - -

JOHNSON'S New
all-purpose
BRAZING FLUX!

Here's the Flux for those really TOUGH jobs in your shop. JOHNSON'S NEW ALL-PURPOSE BRAZING FLUX cleans metal all around . . . does an amazing job of dissolving oxides of burned and dirty metals . . . yet DOESN'T BURN OUT! JOHNSON'S NEW ALL-PURPOSE BRAZING FLUX does a faster job at lower cost.

FREE
SAMPLES
sent upon request

JOHNSON
MANUFACTURING CO., INC
Dept. W-10
Mount Vernon, Iowa

Circle No. 90 on Reader Service Card.

Resistance Appoints Cummins and Swanson

Wayne L. Cummins and L. E. Swanson have been named district representatives of Resistance

Swanson

Cummins

Welder Corp., according to announcements by Boyd Giesey, General Manager of the firm. Swanson will serve the St. Paul-Minneapolis area, while Cummins will cover Dayton-Cincinnati.

NWSA Western Zone Meeting Covers Sales And Overhead

Increasing sales and lowering overhead was the subject of discussion at the Western Zone Meeting of the National Welding Supply Association held last month in San Francisco.

In addition to hearing outside speakers discuss employee relations, creative selling and management responsibilities, members heard outstanding distributor and manufacturer members cover profit sharing, welding clinics, sales training, sales policies and handling of returned merchandise.

Gillett Joins Merit

William G. Gillett has been appointed Works Manager of Merit Products Inc. at their Culver City, California plant. He will supervise production of sander discs and grinding wheels.

Morehead Medal Award Features I.A.A. Meeting

Presentation of the James Turner Morehead Medal to Augustus B. Kinzel, director of research, Union Carbide and Carbon Corp., will highlight the International Acetylene Association Convention to be held at the Shamrock Hotel, Houston, Texas, March 22 through 24.

Honored for Contributions

Dr. Kinzel will receive the award for his many sound and important advance contributions to science and technology, and for many others that he inspired and sponsored. He will be cited for his courage in presenting new ideas, his facility in explaining them to technical and non-technical people and for his willingness to share his thinking, imagination and enthusiasm with all.

The Medal will be presented by W. A. Brown, Jr., director and past president of the I.A.A. and president of Liquid Carbonic Corp. E. A. Daniels, I.A.A. president and vice president of Victor Equipment Co., will preside.

Numerous Technical Sessions

Following the opening luncheon on Tuesday, March 22, papers on marine and pipeline welding will be presented at technical sessions.

On Wednesday technical sessions will feature papers on oil field welding, steel production and fabrication and efficient and safe use of the oxy-acetylene process.

Following the presentation of the Morehead on Wednesday evening, March 23, members will conclude convention activities with a business meeting. A joint luncheon with the National Industrial Conference Board will follow.

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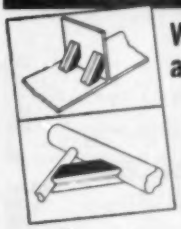

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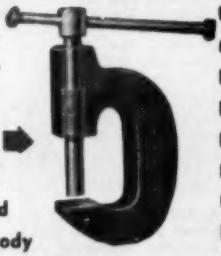

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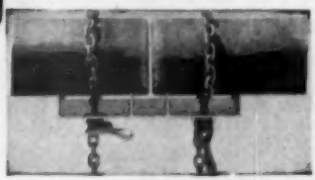

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